Records of the Australian Museum (2012) Vol. 64: 167–211. ISSN 0067-1975
http://dx.doi.org/10.3853/j.0067-1975.64.2012.1590

The *Froggattimyia-Anagonia* Genus Group (Diptera: Tachinidae)

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ABSTRACT. The genera here reviewed have in common many morphological attributes, and in both, all species are parasites of the larvae of leaf-eating insects—pergid sawflies for *Froggattimyia* and chrysomelid or curculionid beetles for *Anagonia*. Perhaps significantly, the host larvae themselves show a degree of physical resemblance and all are charged strongly with eucalyptus oil from their foodstuffs. Twelve species are recognized in *Froggattimyia*, the following six are new: *F. carnei, F. coracina, F. macdonaldi, F. woodorum, F. truncata*, and *F. vicina*, one is near *F. hirta* and remains undescribed. Twenty-five species are recognized in *Anagonia*, the following sixteen are new: *A. angustifrons, A. commoni, A. conformis, A. crosskeyi, A. dayi, A. errator, A. latistylus, A. loripes, A. minor, A. norrisi, A. perplexa, A. propinqua, A. similis, A. teratostylus, A. uptoni*, and *A. zentae; F. tillyardi* Malloch is newly combined in *Anagonia*. Most species are so highly variable as to make a classification based on internal structure at best tentative.

COLLESS, DONALD H. 2012. The *Froggattimyia-Anagonia* genus group (Diptera: Tachinidae). *Records of the Australian Museum* 64(3): 167–211.

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Introduction

This study began many years ago, when the late Dr Phil Carne needed names for the abundant specimens of *Froggattimyia* Townsend that he was rearing from pergid sawflies. It soon became clear that the few available species-names were not at all certain in their application; also, that the sawfly (Pergidae) parasites had apparently close relatives in another, equally confused, group of species that attack leaf-eating beetle larvae—some species placed in *Froggattimyia*, others in *Anagonia* Brauer & Bergenstamm. Although males in both groups were at least moderately easy to distinguish, females were quite the opposite, and after fruitless attempts to solve that problem, the study was overtaken by other tasks and has since languished. However, my known, long-term interest in these genera (as noted by Crosskey, 1973 and Cantrell, 1988) may have diverted studies by others, so I am now attempting to complete the task.

The *Froggattimyia-Anagonia* genus-group (hereafter simply "group") as used here comprises just the members of those two genera. They have in common all or most of the following (largely distilled from the magisterial "conspectus" of Crosskey, 1973): Blondeliini (prosternum setulose; first postsutural (prealar) seta shorter than first postsutural dorsocentral seta and usually little if at all longer than first intra-alar seta; bend of vein M usually not sharply angled; scutellum with stout, divergent subapical setae, apical setae finer, decussate, or undifferentiated); frons of male markedly narrower than that of female, with at most several enlarged reclinate upper orbital bristles, inner vertical setae more or less parallel, outer vertical setae fine or undifferentiated, and ocellar setae almost always fine or lacking; frons of female broad, with one reclinate and 2 well-developed proclinate orbital bristles, inner and outer vertical bristles (the former inclinate or cruciate, the latter lateroclinate), and ocellar setae well developed; parafacial of both sexes usually haired on at least dorsal quarter, rarely with just a few setulae ventral to last frontal bristle; facial ridge bare, except for the usual few short bristles and setulae immediately above the vibrissae; vibrissae inserted well above level of lower facial margin; postpronotal lobe with line of 3–4 stout bristles; two or three presutural dorsocentral setae and 4 postsutural dorsocentral setae; 3 postsutural intra-alar setae; proepisternum haired; katepisternum typically with 2 anterior bristles (1 stout and 1 fine) and 1 stout posterior one; foretibia with 1–2 posterior *(p)* seta; midtibia with submedian vertical *(v)* seta; hindtibia with anterodorsal *(ad)* bristles forming a regular comb and apical posterodorsal *(pd)* bristle long; abdomen usually with pale areas laterally on the first 1–3 segments in the male, but not in female; tergite 1+2 excavate almost to hind margin; tergite 3 usually with one pair of median marginal bristles and usually lacking discal bristles; *i-m* (= dm-cu) distinctly

closer to bend of M than to *r-m*. Females ovolarviparous, with extensible, tubular ovipositor, segment 6 usually about as long as segment 7; sternite 7 (S7) often modified, with a variously-shaped, sclerotized "egg-guide". Throughout, T9 (ninth tergite) is replaced by *syntergosternite 6–8*.

Within Blondeliini, many of the diagnostic attributes might well be plesiomorphic, and the group therefore paraphyletic. A cladistically more "natural" cluster might result by including (apparently) related genera such as *Paropsivora, Deltomyza, Pilimyia*, and *Zenargomyia*; but for present purposes, and plain convenience, I retain the group as defined above.

Abbreviations. In this work I have used the following abbreviations for institutes:

AM	Australian Museum, Sydney;
BMNH	Natural History Museum, London;
CIE	Commonwealth Institute of Entomology, London;
CNIC	Canadian National Insect Collection, Ottawa;
MV	Museum Victoria, Melbourne;
NSWDA	NSW Department of Agriculture, Orange;
QIMR	Queensland Institute of Medical Research, Brisbane;
QM	Queensland Museum, Brisbane;
SAM	South Australian Museum, Adelaide;
SPHTM	School of Public Health and Tropical Medicine (now in ANIC, see below);
UQIC	University of Queensland Insect Collection, Brisbane [now in QM, *q.v.*];
USNM	National Museum of Natural History, Washington;
WAM	Western Australian Museum, Perth.

For persons, in alphabetic order: *DHC*, D. H. Colless; *IFBC*, I. F. B. Common; *KRN*, K. R. Norris; *MSU*, M. S. Upton; *PBC*, P. B. Carne; and *ZL*, Z. Liepa. For brevity, where the label "Terminalia in tube number" occurs more than once in a list of specimens, I have abbreviated all but the first as *T.t.* I have also not hesitated to abbreviate the names of states where these are self-explanatory.

Type specimens

I have had ready access to all existing type specimens located in overseas museums (BMNH and USNM). The remainder, previously in the School of Public Health and Tropical Medicine, Sydney, have now been relocated to the ANIC, Canberra. For new species, if the number of specimens exceeds 30 I have formally designated a set of paratypes and shown the rest in an abbreviated list of *Other specimens examined*. For less than 30 specimens, all but the holotype are to be taken as paratypes unless specifically excluded.

For already described species, I have of course given details of the provenance of the holotype, but otherwise I have merely given the states from which they have been recorded.

Taxonomic problems

There can be few families of insect as difficult taxonomically as the Tachinidae—to use the phrase of the late S. J. Paramonov, a "family *in statu nascendi*", a currently radiating, evolutionary bush, still largely unpruned. The species treated here follow the familiar pattern, with many morphological characters highly variable within species, but not consistently so across species. Despite continent wide, detailed uniformity in a few quite complex, diagnostic attributes (especially genitalic ones), it is commonly true that individual specimens may lack almost any other feature attributed to them in keys or descriptions; or, the expression of an attribute—such as hairiness of the eye—may vary from conspicuous to barely perceptible. Especially in the keys I have tried to qualify the more variable features with terms such as "usually", etc.; but, even when unqualified, the occasional "defining" attribute may still fail. Indeed, many *Froggattimyia* specimens will scarcely key to the tribe (Blondeliini) in which they are customarily placed. Nonetheless, diagnosis by weight of evidence is normally reliable.

In *Anagonia*, and to a lesser extent in *Froggattimyia*, features of the male terminalia are usually decisive at the species level. For this reason, I have not hesitated to describe several new species on the basis of only a few male specimens. Differences in terminalia are often gross and striking, but may also be quite subtle and appreciated only after considerable study; for instance, in the microsetae on the posterior surface of the male cerci.

Females, on the other hand, pose severe problems of identification and, due to strong sexual dimorphism, of associating with conspecific males. They are generally more robust, with stouter bristles and a more strongly grey-pollinose integument. This is especially true in *Anagonia*; but in both genera there are cases where, for instance, batch rearing has allowed a reasonably certain association of the sexes, yet females of two or more species seem quite indistinguishable. Some sharp groupings can be discerned on the basis of genitalic structure, but in general I have left study of that sex for future workers who may have access to better data.

I should note here that I have followed the practice of describing the type species of a genus in some detail, and other members mainly by their differences from the type species. In some cases, however, I have used some other previously described, very similar species as the standard.

Notes on morphology and characters

Morphological terms generally follow the *Manual of Nearctic Diptera* except for features of the wing venation, where I follow the nomenclature of Colless and D. K. McAlpine (1991). I have used the standard abbreviations for bristles of the legs, but not for those of the thorax. A few special features are noted below:

(a) The centre of the parafacial, as used below, is taken to be the point midway between the level of the vibrissa and that of the base of first flagellomere.

(b) The intrapostalar bristle (J. F. McAlpine, 1981), an important diagnostic feature, lies between the dorsocentral and intra-alar rows of bristles, close to the anteromedial margin of the postalar callus. In poorly preserved specimens, it may appear to lie on the callus itself.

(c) The bristle at the anterior margin of the presutural scutum, in line with the intra-alar bristle, is here treated as the first posthumeral. The presutural intra-alar bristle (when present) lies immediately anterior to the suture.

(d) The presutural dorsocentral bristles are not taken to include the small bristle sometimes present at the extreme anterior margin of the scutum and often concealed by the head.

(e) The postocellar bristles lie on or near the posterior

margin of the ocellar plate. They are noticeably larger and stouter than the other setae that invest the plate (with, of course, the occasional exception of the ocellar setae). A case could be made for calling them "postverticals".

(f) Males typically have one or more pairs of differentiated, relatively stout, reclinate upper orbital bristles dorsal to, and more or less in line with, the inclinate frontal bristles. I am interpreting these as reclinate upper orbital bristles.

(g) The most apical (subcentral) posterodorsal *(pd)* bristle on the hindtibia provides an important character. In descriptions I shall refer to it as *pd1*.

(h) The upper occipital bristles comprise 1–2 rather uneven rows of small bristles immediately behind the more conspicuous postorbital row.

Morphometrics

The potential of morphometric aids to identification and classification was investigated using a canonical set of measurements; these are listed below, together with the abbreviated names used throughout. Distances from a seta are taken from the centre of the basal socket.

Eyh greatest height of eye, measured in frontolateral view;
Frw minimum width of frons, usually just in front of ocelli (especially in females) but sometimes further forwards in *Anagonia* males;
Gnw width of gena, measured from the subcranial pit to the nearest point of the eye margin (the pit is a small depression lying at the junction of facial ridge and epistomal margin, mesad of the more ventral infravibrissal bristles; high power may be needed to locate it; if vestigial, the position is easily approximated by eye);
Hdw head width, measured in facial view;
Ivb distance between vibrissae;
Pd1 length of most apical *pd* bristles on hind tibia;
Sbs distance between basal setae of scutellum;
Sdd distance from apical *pd* to subapical *d* bristle on hind tibia, measured between bases;
Sls distance between basal seta and subapical seta of scutellum;
Ssa distance between subapical setae of scutellum; and
Vb-E distance between vibrissa base and eye margin.

These measurements were chosen in the light of previous experience, and after some preliminary trials, as potential indicators of differences in "shape" of head and scutellum, or *(Pd1)* to represent an obvious qualitative character. *Hdw* was taken to provide a consistent standard of overall size. The set was initially larger, but some characters were removed part way through after Principal Component analysis showed that they were contributing little to the exercise.

Wherever possible each measurement was performed on a set of at least 10 specimens. There was no pretence at random sampling, a notion that hardly applies to material of this kind. Simply, specimens were chosen from as broad a range of sizes and sites as possible. However, several extremely small specimens, presumably resulting from premature pupation, were excluded to avoid clouding the already highly variable statistics. For taxonomic comparisons, the most useful characters were the relative magnitudes of *Ivb, Frw, Eyh, Pd1*, and *Sls*, as expressed in the ratios *Ivb/Vb-E, Hdw/Frw, Eyh/Gnw, Pd1/Sdd*, and *Sbs/Sls*. With such "samples", the only reasonably valid statistic is the observed range; I have, though, also included the mean value in the descriptions.

I should note here that the ratio *Ivb/Vb-E* is strongly correlated with size, as reflected in *HdW*; for means of 16 species r = -0.88, and for 34 specimens in the *A. perplexa* complex, r = -0.85. However, due to its perceptible, subjective effect on head shape, it remains a useful character.

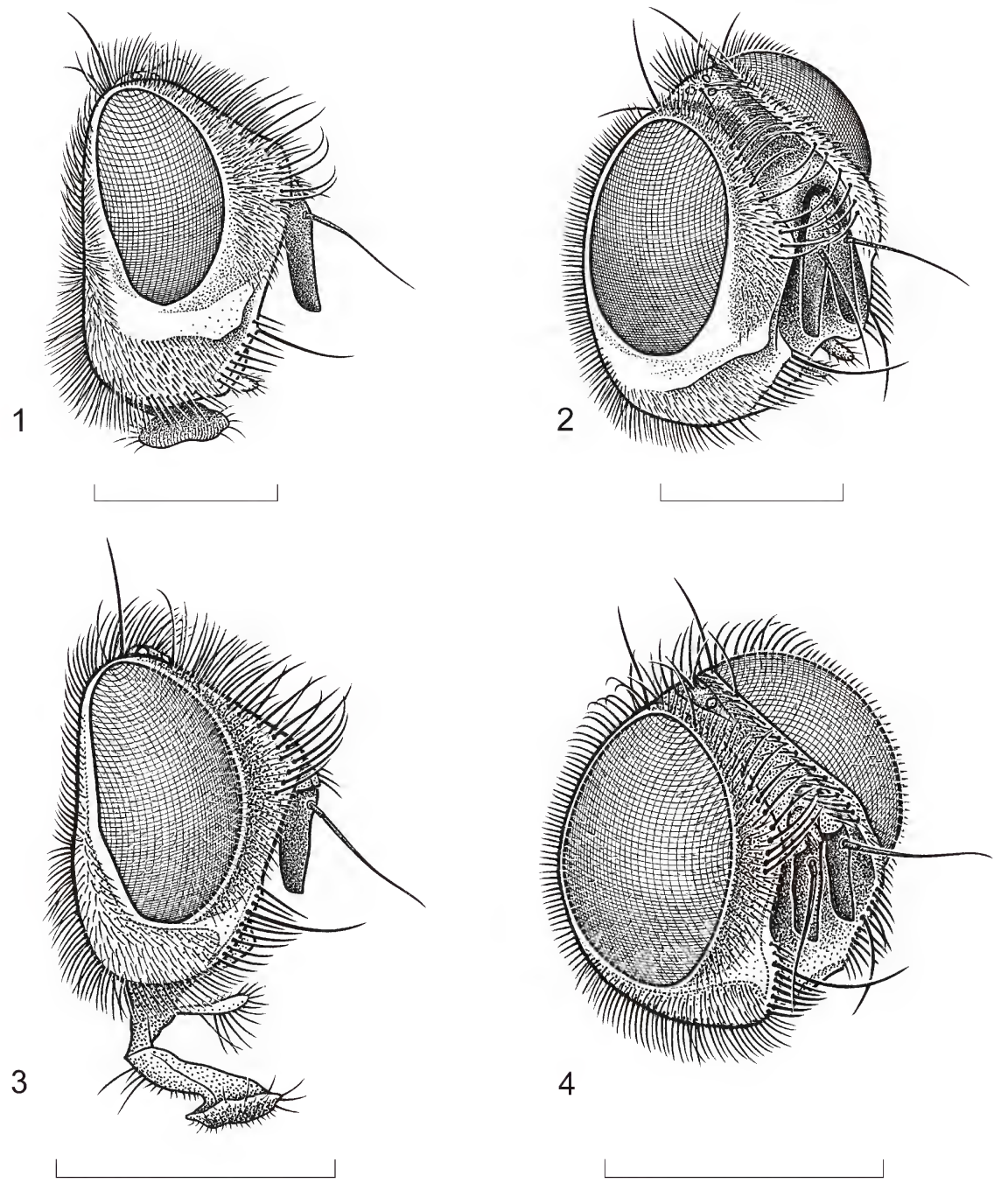
A note on taxonomic methods and concepts

I have followed the "classical" method of first selecting a "study group", in this case based on two easily recognized, very similar and presumably closely related genera, then accumulating specimens identified as belonging to that group from as many sources as possible. In the present case, most came from the ANIC, collected over many years by myself and colleagues. This material was sorted into morphospecies, using for a start the characters provided by previous workers—especially the "Conspectus" of Crosskey (1973). Other characters were added as noticed, until the stage was reached where the material was resolved into clusters that were internally relatively homogeneous, but separated from each other by sharp discontinuities of the kind that is traditionally and reasonably taken to separate "good" species. That is to say that no characters were found that would satisfactorily divide a cluster; and, with stated exceptions (e.g., many females), all specimens could be allocated with fair confidence to one cluster or the other. I call such clusters "basic taxa" (Colless, 2006). They would also seem to qualify as "homeostatic property cluster natural kinds" (Boyd, 1999). However, there are philosophical niceties here, and in any case, I doubt that the term would become popular amongst taxonomists!

These basic taxa, then, represent classical morphospecies, based on the intuitions of an experienced taxonomist. Those intuitions can also be strengthened by details of distribution. In that regard, when very similar specimens come from widely separated localities, it supports their status as comprising a good candidate for a biological species; and when two taxa are both represented in a single locality (sympatric), it makes it likely that they are in fact separate biological species. Such biological data underlie Boyd's (above) logical criterion of homeostasis. All in all, the whole process fits the model of "integrative taxonomy" (Yeates *et al*., 2010) or the broader concept of "inference to the best explanation" (Lipton, 2004).

Also, (again intuitively) a secondary level of clustering was obvious. With only one exception *(F. woodorum)*, all species clearly fell into one or other of two well delineated groups. It was clear that the two previously described genera could usefully be employed there and they were gratefully retained. A case could be made for erecting new genera for some or all of what I have called "species groups", but I see no practical reason for doing so.

The foregoing remarks are prompted by the long-lasting debate over the proper methods for taxonomic research, in which it is too often forgotten that it all starts from operations like those described above. It would be nice to check a molecular barcode on all our specimens; but we have first to delineate a study group! Otherwise, our resources may be dissipated in applying barcodes to, say, several million,



Figs 1–4. Head views of males of *Froggattimyia wentworthi* and *Anagonia rufipes. Froggattimyia wentworthi (1)* lateral, and *(2)* frontolateral views. *Anagonia rufipes (3)* lateral, and *(4)* frontolateral views. Scale bars = 2.0 mm.

randomly chosen specimens of the Australian bushfly! Intuitive alpha-taxonomy provides the basic ground in which we find our study groups; and its "good" species provide the basic hypotheses that are testable using more "high-tech." methods (Colless, 2006).

That said, experience suggests that studies at the genomic level might uncover further diversity within species such as *Froggattimyia hirta, Anagonia rufifacies*, and *A. tillyardi*, revealing "genuine" species that exhibit little or no morphological divergence. However, such studies are beyond my present resources, and, although common enough in the medically important Culicidae and Simuliidae, their application to the present genera seems unlikely in the foreseeable future.

It will be noticed that I have not attempted to provide a formal phylogenetic study. This would, in my opinion, be premature in the present state of our knowledge of these highly variable species. The most that seems appropriate is the arrangement in "species groups", of which some or most are probably monophyletic.

Diagnoses of genera

With all or most of the following attributes:

(a) larger species, head width usually >3.5 mm (almost always >3.0 mm); *(b)* eye (Fig. 1) relatively small, its lower margin at best level with, usually clearly above level of vibrissa, and gena correspondingly broad, ratio *Eyh/Gnw* no more than 2.2 (except in *F. woodorum*); *(c)* vibrissae relatively close together, *Ivb/Vb-E* 0.6–0.9 (except in *F. woodorum* with 1.1); *(d)* reclinate upper orbital bristles scarcely or not at all differentiated; *(e)* parafacial usually not setulose over its entire length (except in *F. hirta* group); *(f)* eye bare; *(g)* scutum usually without presutural median dark vitta; *(h)* numerous pale hairs on pleuron and/or abdomen (*wentworthi* group only); *(i)* tegula often pale brown, basicosta pale golden (darker in *aurea* group); *(j)* femora at least partly pale (except in *F. coracina*); *(k)* male sometimes with stout spines anteriorly at centre of midfemur; *(l)* forefemur of male with apical *ad* spine much finer than adjacent *d* spine and c. 0.4–0.6 its length; in female, *ad* spine rather stouter and longer, c. 0.75 as long as the *d* spine; *(m)* midtibia of male usually with only the stout, subcentral *ad*, rarely with smaller more basal ones (except in *F. hirta*); *(n)* intrapostalar bristle clearly differentiated; *(o)* scutellum with apical bristles well developed, almost as long and stout as adjacent subapical discal bristles, horizontal, and usually crossed (except in *hirta* group and perhaps in *F. woodorum*); *(p)* abdomen with pale dorsal pollinosity on tergites 3 and 4 interrupted at most by central narrow dark vitta (except in *F. carnei*); *(q)* female with mostly fine hairs, often recumbent, on disc of tergite 5; *(r)* ovipositor finely sclerotized, sternite 7 scoop-shaped; *(s)* parasitising larvae of pergid sawflies

..... *Froggattimyia*

With all or most of the following attributes:

(a) smaller species, head width usually < 3.5 mm (always <3.8 mm); *(b)* eye relatively large, its lower margin usually well below level of vibrissa (Fig. 4), ratio *Eyh/Gnw* usually much more than 2.2 (except rarely in *A. anguliventris* and *A. lasiophthalma*); *(c)* vibrissae relatively far apart, *Ivb/Vb-E* usually ≥ 1.0 (often > 1.2); *(d)* one or more pairs of reclinate upper orbital bristles usually clearly differentiated; *(e)* parafacial setulose over its entire length (in most males and some females, profusely so); *(f)* eye clearly haired in a few species only; *(g)* scutum usually with presutural median dark vitta; *(h)* bristles and finer setae on pleuron and abdomen all dark (setae on anepisternum in some females only); *(i)* tegula usually dark brown to black, basicosta paler brown; *(j)* femora all dark or very narrowly pale at apices (except in female *A. lasiophthalma*); *(k)* male without stout spines anteriorly at centre of midfemur; *(l)* in some species, both sexes with subapical *ad* spine of foretibia only slightly or not at all smaller than *d* spine; *(m)* in males of many species, midtibia with 1–2 smaller *ad* bristles basal to large subcentral one; *(n)* intrapostalar bristle often not differentiated; *(o)* scutellum with apical bristles fine, often barely differentiated, and usually parallel and/or upcurved; *(p)* abdomen with pale pollinosity of tergite 3 and tergite 4 also interrupted by brown or black sublateral triangles, often coalesced into broad, apical dark bands (may be absent in [some?] females [or of some species?]; *(q)* female with mostly stout, erect, sometimes spiny bristles on disc of tergite 5; *(r)* ovipositor usually well sclerotized, sternite 7 often forming a stout "piercer"; *(s)* parasitising larvae of leaf-eating chrysomelid and curculionid beetles

..... *Anagonia*

As suggested by the foregoing diagnoses, the problem species comprise *F. woodorum* (which is poorly known), the *hirta* group and *A. lasiophthalma*. *Froggattimyia coracina* is the most poorly characterized (by non-genitalic characters: the male terminalia place it immediately in the *F. hirta* group), but the small eye is diagnostic. For the others, the weight of evidence will give an accurate identification in every case known to me.

Genus *Froggattimyia*

Froggattimyia Townsend, 1916:155. Type species *F. hirta* Townsend, by original designation.
Protomeigenia Townsend, 1916:156. Type species *P. aurea* Townsend, by original designation. Synonymy by Crosskey, 1966:97.

The diagnosis is given in the foregoing key.

Key to males of genus *Froggattimyia*

1 Wing base conspicuously golden-yellow, the colour involving both membrane and veins and extending at least to apices of cells h, m, and cu1a; scutellum and most of its setulae also golden-yellow, forming, with the wing bases, a conspicuous golden, transverse band, clearly visible to the naked eye. Pollen of head and most pleural setae bright orange-yellow. Abdomen dark, the lateral pale areas of tergites 3 and 4 dusky; pollen of tergites 3 and 4 largely confined to median triangles; tergite 5 completely, and conspicuously, pale ashen pollinose ..... *F. carnei* sp. nov.

—— Body without such colour pattern, much less conspicuously marked. Scutellum at most dull brown, usually dark brown. Head pollinosity and pleural setae pale golden or the latter dark. Abdomen paler; tergites 3 and 4 extensively pollinose, tergite 5 therefore not conspicuously different from more anterior tergites 2

2 Legs, including coxae, and all pleural sclerites and hairs uniformly dark. Parafacial fully dark-setulose. Scutellum with apical setae fine, scarcely differentiated. Abdominal tergite 3 (?usually) without differentiated submedian bristles ..... *F. coracina* sp. nov.

—— Legs at least partly pale. Other attributes usually different 3

3 Postpronotal lobe with pale brown ground colour and often a similar transverse band across presutural area of scutum; pleuron often with extensive areas of pale ground colour across anepisternum, anepimeron, and upper katepisternum. Scutellum usually with apical bristles not differentiated, or small and fine, scarcely larger than adjacent setulae. Parafacial entirely or almost entirely setulose, bare on at most a narrow strip along the eye margin. Abdominal syntergite 1+2 and tergite 3 only rarely with differentiated submedian [?median marginal—see general comments] bristles. Legs often with extensive dark areas. Terminalia as in Figs 20–22 4

—— Postpronotal lobe, presutural area of scutum, and almost all of pleuron with dark ground colour. Scutellum almost always with well differentiated apical bristles, only a little smaller than preapical bristles. At least one, usually both, of abdominal syntergite 1+2 and tergite 3 with clearly differentiated pair of submedian marginal bristles. If legs with extensive dark markings, then parafacial setulose on dorsal half only. Terminalia various 5

4 Coxae mainly dark, femora with about basal 40–60% dark. Pleural sclerites and hairs extensively dark ..... *F. hirta* Townsend, *dark form*

—— Coxae mainly (usually entirely) pale, femora with at most a trace of darkening at base. Pleural sclerites and hairs usually extensively pale ..... *F. hirta* Townsend, *pale form*

5 Pleuron with pale hairs except on part or all of anepisternum. Legs without extensive dark markings. Abdominal tergite 4 often with pale setulae on ventrolateral areas 6

—— Pleural hairs all dark. Legs usually with extensive dark areas on at least forefemur. Abdominal tergite 4 with dark setulae on ventrolateral areas 9

6 Reclinate upper orbital bristles not at all differentiated from adjacent setae along narrowest part of the frontal vitta, immediately in front of anterior ocellus. Parafacial setulae usually extending well on to ventral half of sclerite. Gena usually with mainly dark setulae. Dorsum of abdomen usually golden pollinose, especially on tergite 5. Abdominal tergite 4 with mainly pale setulae on ventrolateral areas. Midfemur usually with 1–4 stout bristles near centre of anterior surface. Cerci relatively short and stout, in lateral view apices tapering abruptly, nipple-like, slightly surpassed by apices of the surstyli; surstylus obliquely truncated in lateral view, in posterior view with apical part curved outwards; syntergosternite 6–8 relatively short and stout, its posterior margin steeply declivitous (Figs 5–7) ..... *F. wentworthi* Malloch

—— Reclinate upper frontal bristles clearly distinguishable by stoutness of bristle and/or its socket over the narrowest part of the frons, between the eyes, often extending to level of anterior ocellus and sometimes terminating in a distinct prevertical bristle. Parafacial setulae sometimes confined to dorsal half of sclerite, or scarcely reaching past its centre. Gena sometimes with mainly pale setulae. Abdomen with silver or grey pollen dorsally.

Abdominal tergite 4 sometimes with mainly dark setulae on lateroventral areas. Midfemur sometimes without usual anterior group of stout bristles; syntergosternite 6–8 more rounded (except in *F. icholsoni*) 7

7 Parafacial setulae extending well on to ventral half of sclerite. Terminalia more or less identical with those of *F. wentworthi* ..... *F. nicholsoni* Malloch

—— Parafacial with setulae confined to dorsal half or scarcely extending to ventral half; syntergosternite 6–8 relatively long, its posterior margin gently sloping 8

8 Cerci short and stout, as in *F. wentworthi* ..... *F. fergusoni* Malloch

—— Cerci relatively long and narrow, their apices at least level with, and usually surpassing those of surstyli (Figs 8–12) ..... *F. vicina* sp. nov.

9 Apex of syncercus blunt, curved distally (or dorsally). Surstylus shorter than height of epandrium (Figs 16–19) 10

—— Apex of syncercus sharply pointed, straight or curved anteriorly (or proximally). Surstylus as long as, or longer than, height of epandrium (Figs 14, 15, 75) 11

10 Apex of cercus, in posterior view, broad and truncate ..... *F. truncata* sp. nov.

—— Apex of cercus, in posterior view, sharply pointed and curved anteriorly ..... *F. woodorum* sp. nov.

11 Apex of surstylus sharply pointed and curved anteriorly (or ventrally) (Fig. 14) ..... *F. aurea* (Townsend)

—— Apex of surstylus straight and rounded apically (Fig. 75) ..... *F. macdonaldi* sp. nov.

Froggattimyia wentworthi species group

I use this term to designate a set of 6 species that are closely similar structurally, to an extent that leaves their taxonomy still somewhat uncertain. All have yellow legs, pale pleural bristles (except for a small patch of dark ones on the anepisternum), and generally similar terminalia. One *(F. carnei)* has, inter alia, a very distinctive colour pattern in both sexes, but the others are reliably identified only as males. *Froggattimyia wentworthi* has a characteristic reduction of the reclinate upper orbital bristles; but dissection of the terminalia is desirable for this species and essential for the others. Females with extensive setulae on the parafacials and golden pollinosity on tergite 5 are likely to be *wentworthi* or *nicholsoni*, but those with reduced setulae and grey pollinosity on tergite 5 may be either *fergusoni* or *vicina*. If the parafacial setulosity is very reduced, completely confined to the dorsal half of the sclerite, *vicina* is the more likely (but see *F. aurea* below).

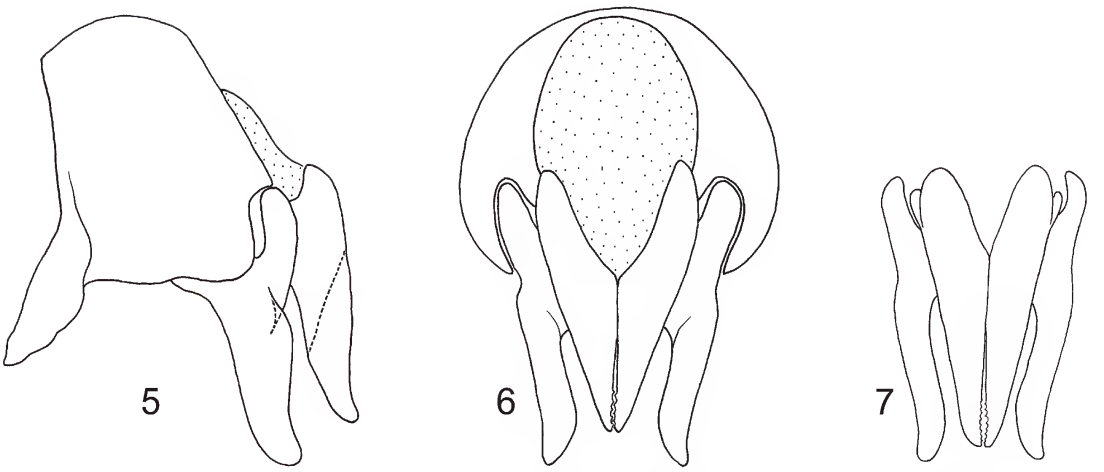
Froggattimyia wentworthi Malloch

Figs 1, 2, 5–7

Froggattimyia wentworthi Malloch, 1934:3–4.

Type. *Holotype* male in ANIC, Wentworth Falls, NSW.

Male. *Head* (Figs 1, 2): Width 3.6–4.4, mean 4.02 mm., approximately 4 times as wide as frons; *Gnw/Eyh* 0.5–0.6, mean 0.53; *Ivb/Vb-E* = 0.7–0.9, mean 0.8. Ground colour pale brown anteriorly and ventrally, dark brown to black on occiput and dorsally on fronto-orbital plate. Anterior surfaces with golden to pale golden pollinosity, except for thinner, silver pollen on face; silvery to very pale golden pollen on postorbits dorsally and silver-grey on occiput. Scape pale brown with a row of minute setulae; pedicel pale brown with pale grey pollen in appropriate light and usual cluster of short spines and setulae; first flagellomere pale brown basally, darkened to a varying degree along dorsal (anterior) margin and across apex; aristomere 3 pale brown on most of the swollen basal portion. Mouthparts pale brown. Inner vertical bristles well developed, slightly inclinate in facial view, somewhat reclinate in lateral view; outer vertical bristles at most finely or (usually) not at all differentiated; ocellar seta fine, sometimes lacking, but usually clearly differentiated; postocellar setae 2–6 (usually more than 2). Reclinate upper orbital bristles not clearly differentiated from adjacent bristles along narrowed part of interfrons, between eyes and immediately in front of ocellar triangle, but 1 or more pairs of reclinate upper orbital bristles sometimes differentiated, standing in line with upper frontal bristles. Vertex, frons, and parafacial with black hairs and setulae. Parafacial setulose to at least centre and usually with at least a few scattered setulae on ventral half; sometimes almost completely setulose and/or with a detached cluster of tiny setulae at ventrolateral angle, near eye. Genae with at least a few (usually mainly) dark setulae on anterior, convex portion, becoming orange-brown on ventral areas. Gular, postgular, and occipital areas with pale brown to orange hairs and setulae. Postocular strip with 1–2 rows of dark hairs.



Figs 5–7. *Froggattimyia wentworthi*, male terminalia, *(5)* lateral, and *(6, 7)* posterior views.

Thorax. Dorsally, ground colour mainly black, with silver-grey dusting except on 2 pairs of narrow vittae, interrupted at the suture, one between dorsocentral and acrostichal rows of bristles, reaching to about the level of second postsutural dorsocentral, the other between dorsocentral and intra-alar rows, reaching almost to scutellum; sometimes a short median postsutural vitta as well. However, ventral half of anterior pronotum with pale dusting, and postalar callus with brown ground colour. Bristles and setulae dark, except for pale brown hairs on ventral half of pronotum and sometimes at sides of scutellum. Postpronotal bristles 3–4 in a row; presutural dorsocentral bristles 3 (rarely 2 or 4) + 4 postsutural bristles (rarely 5); acrostichal bristles 3 + 3 (rarely 4); intra-alar bristles typically with 1 presutural (usually rather fine, occasionally out of line or missing) and 3 postsuturals, the first occasionally missing; also, 2–3 posthumeral bristles, a stout presutural, and 2 (rarely 3) notopleural bristles; first postsutural supra-alar (prealar) seta rather larger than first postsutural intra-alar but smaller than first postsutural dorsocentral. Intrapostalar bristle well developed, about as large as first postsutural dorsocentral. Scutellum with dull brown to dark brown ground colour, and grey dusting visible at a viewing angle of about 45°; the usual basal, lateral, discal (1 or 2), and subapical pairs of bristles present, the latter strongly divergent; apical pair usually well developed and decussate, only a little smaller than the discals. Laterally, pleuron with mostly dark brown ground colour and silver-grey pollinose. Larger bristles mostly black, finer hairs and setulae pale brown or golden, except for a patch of fine black hairs dorsally on anepisternum; the fine hairs mostly with crinkly tips. 1–2 stout upcurved proepisternal bristles and 1–3 similar proepimeral bristles; katepisternum with 1 large and 1 small anterior bristle (the latter rarely missing) and 1 stout posterior; 1 large and several smaller anepimeral bristles; and a linear group of about 6–10 quite long but slender meral bristles, variously dark or pale, with a considerable number of associated pale hairs; katepimeron haired.

Legs. Entirely pale brown except for occasional darkening around bases of femora. Bristles and setulae black, except for some golden ones on coxae and trochanters and to a varying extent posteriorly on all femora. Forefemur with conspicuous *d, pd*, and *pv* rows of long stout hairs; foretibia with 1–2 *p* bristles and occasionally 1–2 *pd*, also a row of small, barely differentiated, spiny *ad* bristles on about the basal half, and *pv, d* and *ad* preapical bristles, the first 2 stout but the last much smaller, often scarcely differentiated. Midfemur usually with a stout spine anteriorly near centre (absent in about 10% of specimens), 2–3 preapical *pd* of graded lengths, and *pv* row of stout bristles; about 10% of specimens also with 1–3 stout hairs differentiated in a sub-basal *av* row; midtibia with stout *ad* and *v* near centre (rarely with 1–2 smaller, more basal *ad*) and 2–3 *p* or *pd* bristles; also preapical *ad* and *pd* and about 6 apicals of various lengths, the *av* and *pv* usually the stoutest. Hindfemur with *ad* row of long hairs, an *av* row usually with a distinct "gap" past centre, and a *pv* row on basal half only; hindtibia with conspicuous, comb-like row of short, rather spiny *ad* bristles, including 1 longer one near centre; also 1 stout and 0–3 smaller *av*, 1 stout and 1–2 smaller *pd*, 1 stout preapical *d*, 1 shorter but stout preapical *ad* and an apical *av* spine; *Pd1/Sdd* 0.7–1.1, mean 0.53.

Wing. Membrane tinged with brown across a broad area at base, covering basal cells and extending through costal and subcostal cells and faintly along vein R2+3; veins pale brown to brown over most of their length, darkening apically; tegula and basicosta typically pale brown (occasionally mid brown), the latter paler than the former. Swollen base of vein R4+5 with 1–6 setulae dorsally, 1–5 ventrally. Costa setulose ventrally to apex of Sc. Crossvein r-m near centre of discal cell; vein M1+2 from i-m to bend a little shorter than or equal to i-m, but much longer than from bend to wing margin; bend rather sharply angled for a blondeliine. Calypters greyish to cream or pale gold, margins white to gold, with a tuft of pale golden, crinkly hairs at their external junction; lower calypter with posterior margin gently curved, its internal angle closely abutting scutellum.

Abdomen. All tergites black in ground colour, syntergite 1+2, and tergites 3 and 4, with lateral reddish brown areas that cover about 50% of the disc in both dorsal and ventral views, extending variably on to tergite 5. Tergites with silver to golden pollen, tending to become more golden on posterior segments, but absent on a narrow dark median vitta over most or all of tergites 3 and 4, and sometimes tergite 5. A pair of

median submarginal bristles (rarely with 1–2 supplementary bristles) almost always present on both syntergite 1+2 and tergite 3. Sternite 4 black with black hairs, other sternites scarcely visible. Hairs and setulae all black on dorsum, except for occasional pale ones on tergite 5; ventrally, pale brown or golden, except along margins of tergites, variably on disc of tergite 5, and on sternites 3 and 4.

Terminalia (Figs 5–7). Ground colour pale brown. In lateral view, surstyli with apices slightly surpassing those of cerci, somewhat variable in shape, but usually digitate with rounded apex, often slightly curved in a posterior direction; cerci of a similar shape. In posterior view, surstyli with their apices slightly curved outwards; cerci separated basally by a rather broad, V-shaped notch; apex with a short row of medial teeth.

Female. Similar to male, differing essentially as follows: *Head* width 4.0–4.4, mean 4.13 mm; approximately 3 times as wide as frons. Anterior surfaces with golden pollen, except on face. Outer vertical bristles and ocellar bristles well developed, as are 2 stout proclinate orbital and 1 reclinate or lateroclinate (prevertical) bristles; anterior proclinate bristle rarely (c. 1%) absent on one side; reclinate upper orbital bristles usually rather fine and irregular, more clearly differentiated than in male, but still rather distinctive. More ventral parafacial setulae usually pale. Genal setulae usually all or almost all pale. Scutellum with more conspicuous pale grey or milky pollinosity; setulae all dark above but sometimes pale laterally at base and/or ventrolaterally. Foretibia with spiny bristles in *ad* row much more prominent and of graded lengths. Midfemur with 2–9 spiny bristles of various sizes anteriorly near centre, and 1–3 stout *av* hairs towards base; midtibia with 1–2 smaller *ad* bristle basal to the large, stout one. Hindtibia with spines in *ad* row sparser and longer, and usually with 2 longer members. Wing with up to 8 setulae on base of vein Rs. Abdomen usually all dark in dorsal view except for a pale area, of variable extent, at apex of tergite 5; in ventral view mainly dark, except for posterior apical bands on tergites, sometimes with pale areas of variable extent laterally on the tergites; visible sternites (usually just sternite 5) pale brown; pollinosity, especially on tergite 5, bright to pale golden, narrow median dark vitta barely or not at all represented.

Terminalia. Forming an extensible tube about 1.5 times as long as tergite 5; segment 6 very finely sclerotized, but setose on apical half; segment 7 rather more heavily sclerotized, tergite 7 consisting of a pair of narrow hemitergites, sternite 7 a simple scoop-like structure with rounded apex.

Distribution. Qld, NSW, ACT, Vic., Tas, and WA; no doubt in SA also.

Biology. My abundant material of *F. wentworthi* has one most striking feature: the great majority of specimens have been reared. In my experience this is most unusual in Tachinidae, which are commonly taken also at light, in traps, or by hand-netting—as, indeed, is the case with the closely related *F. vicina* sp. nov. (but not other members of the group, which resemble *wentworthi* in this respect). I see no obvious reason for this phenomenon. It may be fortuitous: Dr Monty Wood has recently netted several specimens by "hilltopping". For *F. wentworthi*, the host in every case is a pergid sawfly—especially *Perga affinis* Kirby, but also *Pergagrapta polita* (Leach), *Pergagrapta bella* (Newman), *Pergagrapta gravenhorstii* (Westwood), *Pergagrapta spinolae* (Westwood), *Perga dorsalis* Leach, and *Pseudoperga* sp.

Field observations of *F. wentworthi* by Dr Carne and (especially) Mr M. F. Leask (all in MSS) state that the adult fly lays an egg in a skin-fold on the mature sawfly larva, by protruding its ovipositor forward ventrally between its legs to a quite remarkable distance, swaying back and forth to avoid the violent strokes of the host's abdomen. Eventually, the ovipositor makes contact and an egg is laid. This account is difficult to reconcile with the length of the ovipositor in dissections; while obviously extensile to some degree, it seems unlikely to attain even the length of the abdomen. Such behaviour would be possible for some species of *Anagonia*, but these observers would hardly mistake a chrysomelid larva for that of a sawfly. I am unable to explain the apparent discrepancy.

In the laboratory, the fly emerges from the host cocoon usually after some 3–5 months; but as few as 2 months, and as many as 10, have been recorded.

Notes. Malloch's holotype of *wentworthi* is very well preserved, and seems clearly conspecific with the species just described. However, it has one remarkable idiosyncrasy: both hindtibiae lack the preapical *ad* bristle. In several hundred specimens of what I am here calling *F. wentworthi*, I have seen only one similar specimen. I have to conclude that Malloch's unique specimen was, by a remarkable coincidence, an extremely rare variant.

Froggattimyia nicholsoni Malloch

Froggattimyia nicholsoni Malloch, 1934:5.

Type. *Holotype* male in ANIC, Lindfield, NSW (published as "Sydney").

Extremely similar to *F. wentworthi*, and possibly only a variant of that species; male differing principally in having the reclinate upper orbital bristles moderately well differentiated—distinctly more so than is usual in *wentworthi*, but less than in *F. fergusoni* Malloch and *F. vicina* sp. nov. Also, abdominal dorsum with grey, rather than golden pollen (but this sometimes true of *wentworthi*). Terminalia within the range of *wentworthi* in the shapes of syntergosternite 6–8, cerci and surstyli.

The female has not been distinguished, and is presumably identical with that of *wentworthi*.

Distribution. NSW, Vic., WA; no doubt in SA as well.

Biology. Bred from "sawfly larvae", some identified as *Perga* species.

Notes. I am strongly tempted to synonymize this species with *F. wentworthi*, but have taken a more cautious path following Malloch who separated the two species albeit on different grounds. All but the type were reared from sawfly larvae or cocoon masses, including *Perga* sp. and *Pergagrapta turneri* Bens.

Froggattimyia fergusoni Malloch

Froggattimyia fergusoni Malloch, 1934:4–5.

Type. *Holotype* male in ANIC, Wyalkatchem, WA.

Also very similar to *F. wentworthi*, but the male with strongly differentiated reclinate upper orbital bristles; parafacial often with setulae more or less confined to dorsal half. Terminalia with syntergosternite 6–8 rather longer, with less steeply sloping posterior margin (but not as marked as in the next species, *F. vicina* sp. nov.); surstyli in posterior view more or less straight or incurved.

Females associated with identified males are barely separable from those of *wentworthi*. The setulosity of the parafacial is rather reduced in some specimens, but the difference is hardly striking. However, with more and better identified specimens, the blue-grey pollinosity of the tergites (and especially tergite 5) may prove useful to separate this species from *wentworthi*, but not from other *Froggattimyia* spp.

Distribution. WA and SA; one doubtful record from NSW.

Biology. All but two specimens were reared from larvae of unidentified species of pergid sawfly.

Notes. With additional material, Malloch's characters for differentiating this species no longer hold. In particular, his type specimen has an abnormally broad parafacial and unusually narrow median dark stripe on the abdomen. However, I am fairly sure that this is a good species and that it includes the holotype.

Froggattimyia vicina sp. nov.

Figs 8–12

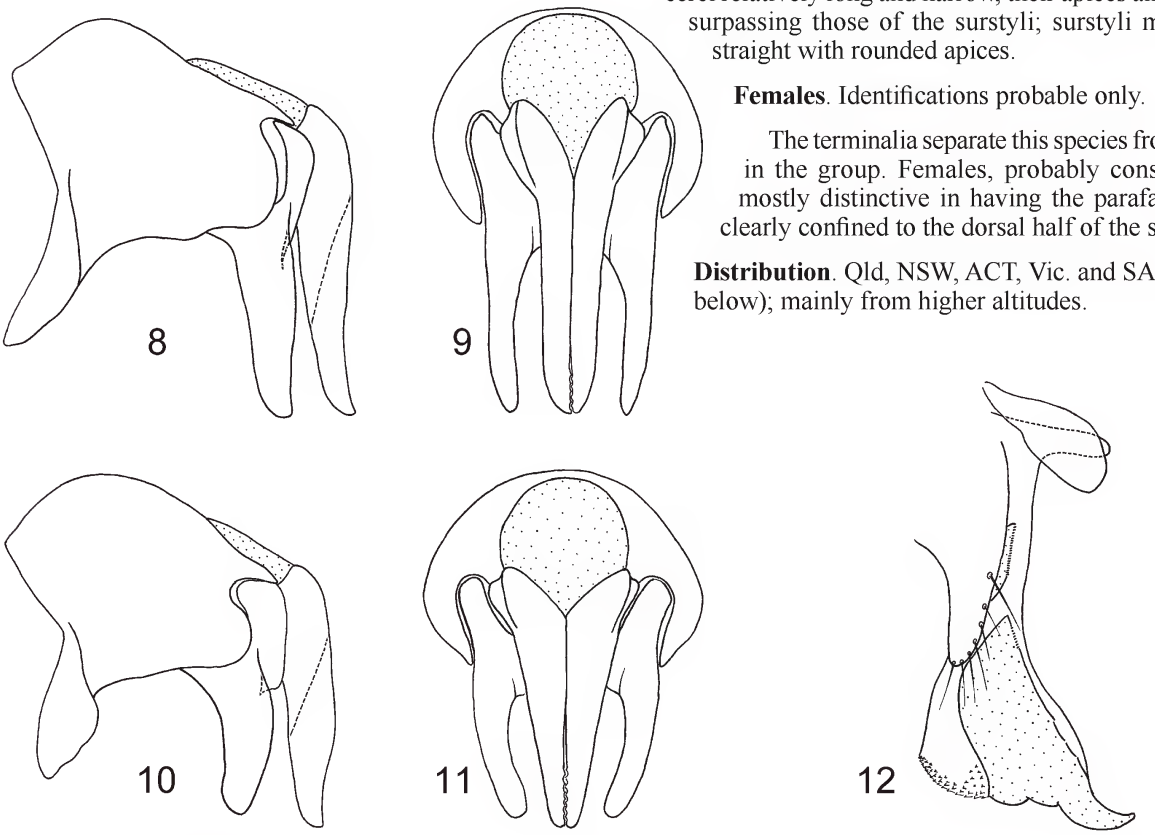
Types. *Holotype* male in ANIC no. 29-029374; Bendora, ACT, 5 Feb. 1952, Z. Liepa. Terminalia in tube 267. *Paratypes* (all males).—*Australian Capital Territory:* Black Mtn, light trap (3 specs.), 19 Dec. 1961, IFBC, T.t. 269; 31 Dec. 1965, IFBC, T.t., 249; 9 Apr. 1969, IFBC, T.t. 411; 3 mi N of Mt. Coree, 3000 ft., 13 Mar. 1967, IFBC.—*New South Wales:* Tubrabucca Ck, Barrington Tops, 4200 ft., 8 Jan. 1956, IFBC, T.t. 271; 4 specs., all NSW, bulked from different sites, ex culture (3, 9, 16, 16), 14 Apr. 1959, T.t. (4, 5, 12, 312), ex *Perga affinis affinis* (Hym.); Tooloom, 30 Oct. 1961, IFBC, T.t. 278; Springwood, coll. 2–4 Apr. 1983, K. Whitfield, ex pergid larva, T.t. 2041 (NSWDA); Ingold's Knob, Kioloa State Fst., 10 Jan. 1986, site 5, KRN, T.t. 2062.—*Victoria:* Warrandyte, 1 Dec. 1925, G. F. Hill, T.t. 268; Ferntree Gully, 22 Jun. 1932, b., A. N. Burns (MV); bred from larvae, 28 Mar. 1958, No. 570. Clunes, M. F. Leask, BMNH, T.t. 311; the same but T.t. 282; the same but 4 Apr. 1958, no. 485, T.t. 280.—*Tasmania(?):* parasite from sawfly larvae, K. Is. Nov. 1949, A.N.B. (MV); the same but from sawfly pupae, T.t. 2104.—*Queensland:* Mt. Crosby, 12 Nov. 1964, G. B. Monteith, T.t. 410; Millstream Falls, W of Ravenshoe, 25 Jun. 1971, E. F. Riek.

Male. Very similar to *F. fergusoni*; male with upper reclinate upper orbital bristles strongly differentiated and parafacial often (but not always) setulose on upper halves only. Parafacial usually somewhat broader, *Ivb/Vb-E* 0.6–0.7, mean 0.7. Terminalia (Figs 8–12, distinctive: syntergosternite 6–8 relatively long, with gently sloping posterior margin, cerci relatively long and narrow, their apices almost always surpassing those of the surstyli; surstyli more or less straight with rounded apices.

Females. Identifications probable only.

The terminalia separate this species from all others in the group. Females, probably conspecific, are mostly distinctive in having the parafacial setulae clearly confined to the dorsal half of the sclerite.

Distribution. Qld, NSW, ACT, Vic. and SA or Tas. (see below); mainly from higher altitudes.



Figs 8–12. *Froggattimyia vicina* sp. nov., male terminalia. Holotype *(8)* lateral, and *(9)* posterior views. Paratype *(10)* lateral, and *(11)* posterior views; *(12)* paratype aedeagus.

Biology. Differs from others in the group in that many (10/23) specimens were captured as adults; others were reared from *Perga affinis, Pseudoperga* sp., and perhaps *Pergagrapta* sp. The difference is rather striking and presumably statistically significant; but its cause is quite obscure.

Notes. One male, from Stanthorpe, Queensland, has an unusually dark abdomen, with only small, faint pale areas laterally on tergite 3; also, the parafacial setulosity extends well on to the ventral half. The terminalia, however, are typical. Also, one specimen labelled "K. Is." (presumably Kangaroo I., South Australia, or King I., Tasmania; collected by A. N. Burns of Museum Victoria, so probably the latter) has the cerci relatively narrow, but slightly shorter than the surstyli. However, the reduced setulosity of the parafacial places it in *vicina*. The specific epithet refers to the close similarity of the species to several others.

Froggattimyia carnei sp. nov.

Fig. 13

Types. *Holotype* male in ANIC no. 29-029371, 9 mi ESE of Murrumburrah, NSW, coll. 6 Feb. 1971, emg. 25 Mar. 1971, R. S. McInnes, ex cocoon mass of *Perga affinis*; terminalia intact. *Paratypes* (all in ANIC)—*New South Wales* (males): Cudjegong Ck, 7 mi SW of Cootamundra, Dec. 1962, (site 236), PBC, terminalia in tube 315; Riverina, Western Slopes, 1962, 1963 (B) PBC, T.t. 1; Boorowa, Dec. 1962, (site 248), PBC, T.t. 316; 4 mi WSW of Illabo, R. S. McInnes, ex cocoon masses of *Perga affinis*, coll. 6 Feb. 1970, emg. 23 May 1970; 9 mi ESE of Murrumburrah, coll. 5 Feb. 1971, emg. 21 Mar. 1971, R. S. McInnes. —*New South Wales* (females): 4 mi E Cunningar, Dec. 1962, (site 246), PBC; 9 mi ESE of Murrumburrah, coll. 5 Feb. 1971, emg. 13 Apr. 1971, R. S. McInnes (2 specs.); Wallendbeen, Dec. 1962, (site 241), PBC. —*Victoria* (female): 10.6 mi ESE of Benalla, coll. 4. Feb. 1971, emg. 13 Apr. 1971, R. S. McInnes. All reared from *Perga affinis*.

Other specimens examined: 162 males and 128 females, coll. PBC or R. S. McInnes, from NSW (Murrumbateman, Cootamundra, Junee, Holbrook, Wallendbeen, Illabo, Young, Coolac, Cunningar, Wombat, Tarcutta, Binalong, Boorowa, Muttama) and Victoria (Benalla, Euroa), Nov.–Feb. 1962–1972; also Blue Mtns, 25 Aug. 1922, SPHTM; Ballina, Froggatt, 10 Jun. 1893; Blundells, Canberra, 28 Feb. 1934, T. G. Campbell; Ararat, Vic., G. F. Hill (BM); Vic., Ballarat, Glen Park SF, M. F. Leask.

Very similar structurally to *F. wentworthi*, differing as follows:

Male. *Head*. Anterior surfaces with rich orange-brown pollinosity; postorbits with golden pollen. Ocellar bristles sometimes only slightly differentiated. Parafacial setulose only to about middle, or with a few scattered setulae on ventral half.

Thorax. Dorsally, postalar callus and scutellum with conspicuously pale brown ground colour, continuing across the wing bases to form a broad transverse pale brown band, visible to the naked eye. Median postsutural vitta more commonly present. Hairs and setulae mainly dark, but pale brown on ventral half of anterior pronotum, also around margins of scutellum and at least narrowly across its basal ⅓,

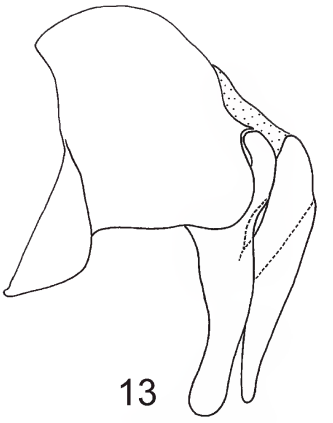


Fig. 13. *Froggattimyia carnei* sp. nov., male terminalia, lateral view.

occasionally over most of the disc; brown setulae also present sometimes in presutural area and between postpronotal lobe. Dorsocentral bristles 3 (rarely 4) + 4; acrostichals 3 + 3 (rarely 4); a fine presutural intra-alar present, close to the suture, in about 20 % of cases; also, typically, 3 postsuturals, but the first missing on at least one side in about 25% of specimens and when present finely developed; the second also occasionally missing. Scutellum with thin, fine pollinosity, visible only at extreme viewing angles. Laterally, katepisternum with small anterior bristle missing on at least one side in about 30% of specimens.

Legs. Midfemur always with a stout spine anteriorly near centre (sometimes plus 2–3 smaller associated spines); about 50% of specimens with 1–3 stout hairs differentiated in a subbasal *av* row. Hindfemur with *Pd1/Sdd* 0.6–0.9, mean 0.71.

Wing. Brown colour of wing base and veins rather paler and more conspicuous. Swollen base of vein R4+5 with 1–5 setulae dorsally, 0–2 ventrally. Calypters pale brown.

Abdomen. Dorsally, syntergite 1+2 black with small brown lenses on lateral quarters; tergite 3 black, dusky brown on lateral quarters and grey pollinose on a median triangle and narrow basal band; tergite 4 similar; tergite 5 uniformly grey pollinose, contrasting strongly with the much darker anterior segments. Both syntergite 1+2 and tergite 3 usually with 1–4 median marginal bristles, rarely with none. Ventrally, lateral brown areas of T1–3 continuing over lateral thirds of the segments; remainder of venter lightly grey pollinose. Sternites scarcely visible. Hairs and setulae all black, except for median ventral patch of pale brown hairs on segs 1–2.

Terminalia (Fig. 13). Not very distinctive; differ from those of *wentworthi* in rather subtle features of shape, principally the rather "sharper" cerci, which also lack the outward curvature in lateral view.

Female. Immediately recognizable by the characteristic colour pattern, as in the male.

Distribution. NSW, ACT, and Vic.

Biology. *Froggattimyia carnei* resembles *F. wentworthi* in that almost all known specimens have been reared from *Perga affinis* or *Perga* sp. (probably *affinis*). Many were collected at the same time and place as *F. wentworthi*, but I have no evidence as to joint parasitism of the same cocoon mass.

Notes. Despite its distinctive colour pattern, *F. carnei* is otherwise very similar to *F. wentworthi*, and the two are very likely sister-species. They have the same (unusual and presumably synapomorphous) lack of well-developed upper reclinate upper orbital hairs, and the terminalia are very similar. *Froggattimyia carnei*, however, is much more variable in the numbers of katepisternal bristles, abdominal marginal bristles, and parafacial setulae. Also, unlike *P. wentworthi*, all specimens from identified host species are from *Perga affinis* only, and all are from the southwest slopes of New South Wales (apart from a single old specimen from Canberra). One could speculate that this suggests an inability to compete with its sister-species in cooler climates. Its distinctive colour pattern may perhaps be due to character displacement induced by such competition.

The species is named after my friend and colleague, the late Dr Phil Carne.

Froggattimyia aurea species group

I place here a somewhat miscellaneous set of 4 species, 3 of them known from only a few specimens. They all possess the very distinctive feature, in the male, of having the pleural hairs all dark and the legs (usually) with extensive dark markings. The tegula and basicosta are also usually mid to dark brown, noticeably darker than in the *wentworthi* group. For the species known from only 2 or 3 specimens, I describe features of chaetotaxy, etc., as seen in those specimens. However, variation almost certainly occurs, and in the key above I have relied entirely on the distinctive terminalia.

The females are known (by associated rearing) for only two species (*F. aurea* and *F. macdonaldi* sp. nov.), and are doubtfully separable from those of *F. vicina*, etc.

Froggattimyia aurea (Townsend)

Figs 14, 15

Protomeigenia aurea Townsend, 1916:156–157. Synonymy by Crosskey (1966:103).

Type. *Holotype* male in USNM, no. 19974, Manilla, NSW.

Very similar structurally to *F. wentworthi*, differing as follows:

Male. All hairs, bristles, and setulae dark except for post gular and occipital hairs.

Head. Reclinate upper orbital bristles clearly differentiated from adjacent hairs. Parafacial with setulae clearly restricted to dorsal half. Postocellar bristles usually 2 in number.

Thorax. First postsutural intra-alar bristle small or missing, the presutural one often likewise.

Legs. Forefemur dark on basal ¼–⅓ and along ½–⅔ of dorsum; midfemur dark on basal ¼–½; hindfemur dark on basal ½ (1 specimen aberrant in having darkening confined to a trace at bases of femora). Forefemur without stout bristle(s) on anterior surface. Midfemur with subcentral *ad* and *v* bristles shorter than usual, little longer than width of tibia.

Abdomen. Tergites with silver-grey pollen; syntergite 1+2 usually with distinct pair of submedian marginal bristles (but not in holotype), but none on tergite 3.

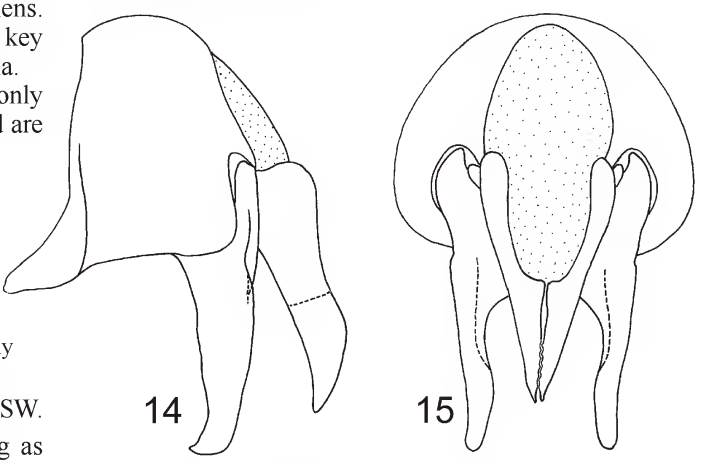
Terminalia (Figs 14, 15). Surstylus in lateral view with hooked, beak-like apex and very sparse setulae; cerci in posterior view deeply excavated basally.

Female (from associated rearing). Resembles male in silver-grey pollen of abdomen, reduced parafacial setulae, and (usually) presence of only 2 postocellar bristles, but abdominal tergite 3 with pair of well differentiated, rather characteristically erect, submedian marginal bristles. Only the postocellar setae separates these few females from those of *F. vicina*.

Distribution. Known only from NSW and Vic.

Biology. All specimens but one were reared from *Pergagrapta spinolae* Westwood or other unidentified pergid larvae.

Notes. The holotype has its highly characteristic terminalia clearly displayed *in situ*, and there is no doubt as to its association with the other specimens—including the specimen mentioned above, that has only a trace of dark colour on the femora.



Figs 14, 15. *Froggattimyia aurea*, male terminalia, *(14)* lateral and *(15)* posterior, views.

Froggattimyia macdonaldi sp. nov.

Fig. 75

Types. *Holotype* male in ANIC no. 29-029372, Ilford, NSW, larvae coll. 29 Aug. 1984, adult emerged 7 Nov. 1984, J. Macdonald, ex *Pseudoperga* sp. voucher, J. Macdonald, terminalia in tube 2105. *Paratype* female, data as for holotype.

Very similar to *F. aurea*, differing as follows:

Male. Parafacial setulae extending well on to ventral half of sclerite. Postocellar bristles indeterminate in number, scarcely differentiated from others on posterior half of plate, all with angularly bent apices. Forefemur mainly dark, except for strip on apical half of ventral surface; centre of anterior surface of midfemur with 1 long, stout bristle. Abdominal tergite 3 with pair of submedian marginal bristles. Terminalia more resembling those of *F. wentworthi*, but surstylus in lateral view tapering to a blunt point (Fig. 75).

Female (from associated rearing). Resembles male in parafacial setulosity but more ventral setulae pale golden; postocellar bristles quite well differentiated, straight, 7 in number.

Distribution. Known only from the type locality in NSW.

Biology. Both specimens were reared from larvae of *Pseudoperga* sp.

Notes. Despite the existence of only 2 specimens, they cannot be accommodated in any known member of the group and clearly represent a new species, which is named after the collector.

Froggattimyia truncata sp. nov.

Figs 16, 17

Types. *Holotype* male in ANIC no. 29-029373, 36°30'S 180°24'E, Bawley Point, NSW, 2 Jan. 1998, D.C.F. Rentz, K. McCarron; terminalia intact. *Paratypes*: 2 males; Blundell's, FCT [former abbreviation for the Australian Capital Territory, now ACT], 23 Nov. 1929, L. M. Williams, terminalia in tube 264; Blundell's, 19 Jan. 56, Fuller, T.t. 2093.

Very similar to *F. aurea*, differing as follows:

Male. *Ivb/Vb-E* 0.6–0.7 in 3 specimens known. Postocellar bristles well differentiated, 3–8 in number. First postsutural intra-alar bristle present or absent; presutural intra-alar present. Femora mainly dark, pale brown on apical ¼–⅕; midfemur sometimes with 1 rather fine bristle at centre of anterior surface. Abdominal tergite 3 with scarcely differentiated pair of submedian marginal bristles. Terminalia of holotype (Figs 16, 17) visible in situ, cerci noticeably short and curiously truncate in posterior view.

Female. Not known.

Distribution. Known only from ACT and NSW.

Biology. One specimen was taken at light; the others were presumably hand-netted.

Notes. It is remarkable that 2 of the 3 known specimens were captured 27 years apart in the same small locality. Moreover, despite that locality's popularity with collectors of Diptera, no other species of *Froggattimyia* has been recorded from there. The host is possibly a sawfly larva.

The species name refers to the appearance of the male cerci in posterior view.

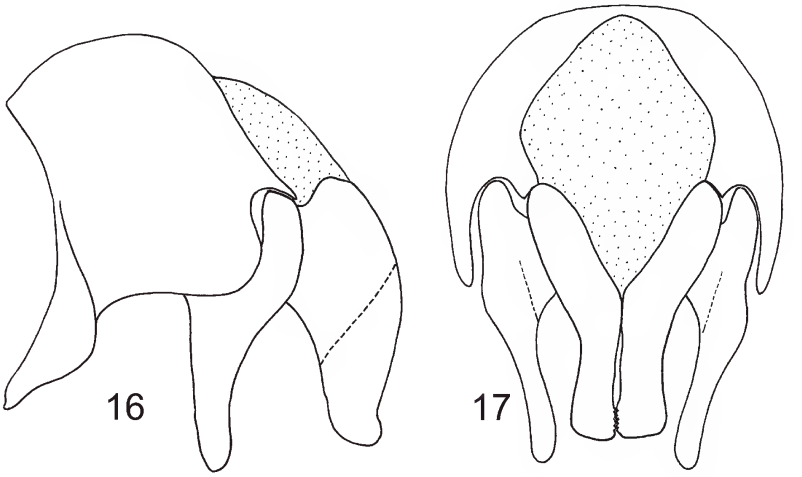
Froggattimyia woodorum sp. nov.

Figs 18, 19

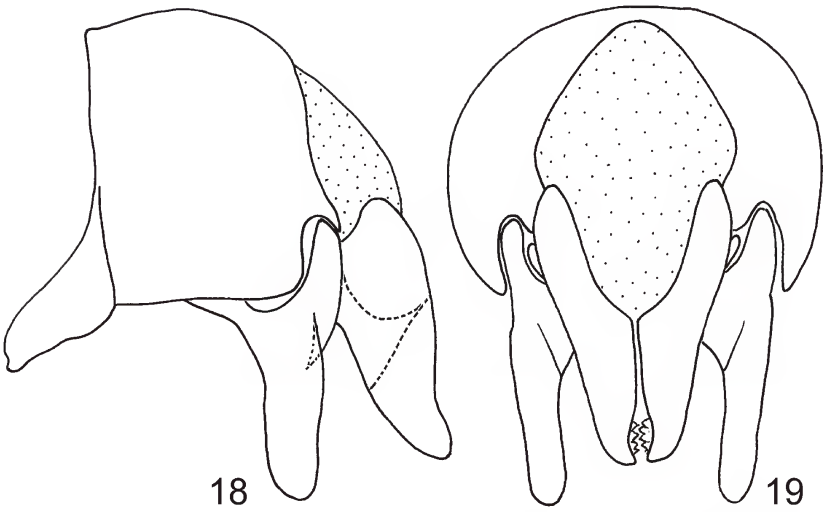
Types. *Holotype* male in ANIC no. 29-029375, Canberra, ACT, summit Mt Ainslie, 8 Jan. 2006, hand net, G. & M. Wood. *Paratypes*:—*New South Wales:* 3 males, same data as holotype; 2 males, Catherine Hill Bay, 12 Apr. 1949, S. J. Paramonov.

Very similar to *F. aurea*, differing as follows:

Male. *Ivb/Vb-E* = 1.1. Reclinate upper orbital bristles strongly differentiated; postocellar setae likewise, 2 in number. Reclinate upper orbital and parafacial setulae distinctly sparse and short. Antenna with noticeably long arista, long enough to reach lower facial margin (unlike all other *Froggattimyia* spp). Femora almost entirely dark, a small pale zone at apices; tarsi also dark; midfemur with 1 stout bristle anteriorly at centre; hindfemur with subcentral



Figs 16, 17. *Froggattimyia truncata* sp. nov., male terminalia, *(16)* lateral, and *(17)* posterior views.



Figs 18, 19. *Froggattimyia woodorum* sp. nov., male terminalia, *(18)* lateral, and *(19)* posterior views.

pd seta (Pd1) unusually long for this genus (*Pd1/Sdd* = 1.0–1.05). Abdominal syntergite 1+2 with very fine pair of submedian marginal bristles, tergite 3 with a very stout pair. Terminalia (Figs 18, 19) with relatively short, "stubby" appendages, the cerci slightly curved apically in a posterior direction.

Female. Not known.

Distribution. Known from ACT and NSW only.

Biology. A female, possibly of this species, was reared from sawfly larvae taken on a "paperbark, *Melaleuca* sp."

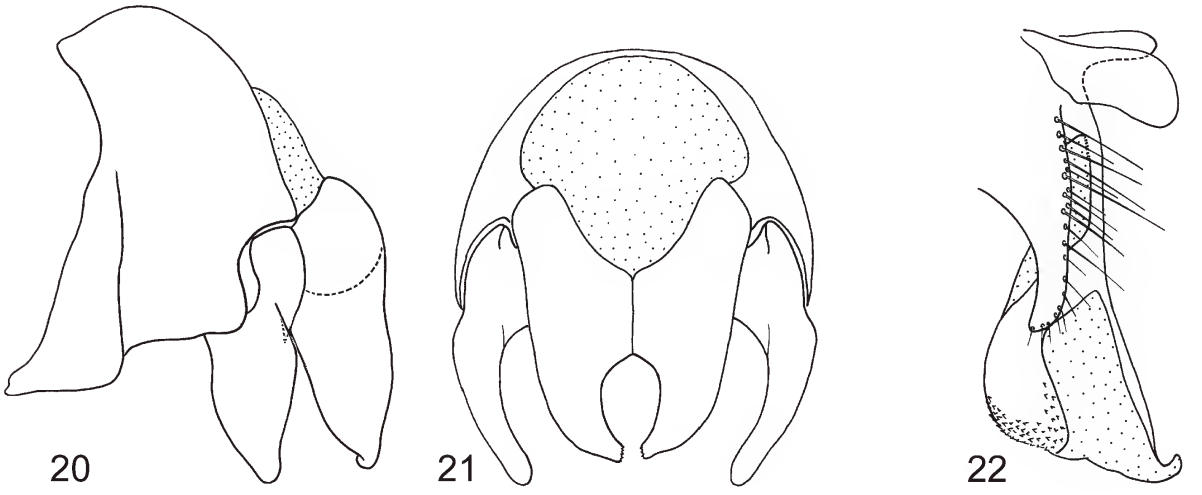
Notes. In some attributes the males resemble those of *Anagonia* spp (as does the doubtful female), but, on balance, I place it here for the present. Like the previous species, the host is unknown, but presumably a sawfly larva.

The species name celebrates the collectors of the holotype: Monty and Grace Wood.

Froggattimyia hirta species group

This group comprises mainly one common species, of which the males (only) vary remarkably in colour patterns—indeed, viewing a very pale specimen beside a very dark one, it is hard to accept them as really conspecific. However, for reasons discussed below, I regard all these as falling in the single species *F. hirta* Townsend. There is also another, related species (*F. coracina* sp. nov.), known from only a few specimens, and what is probably yet another, known from a single female and not named.

Members of the group are firmly characterized by the unusual male terminalia, with short, stout cerci and strikingly profuse short setae on their posterointernal surfaces; also, in both sexes (in almost all cases), the pale ground colour of the postpronotal lobe (except in *coracina*), the finely or not at all developed apical scutellar setae, and the lack of differentiated submedian marginal bristles on abdominal tergite 3.



Figs 20–22. *Froggattimyia hirta*, male terminalia, *(20)* lateral, and *(21)* posterior views, *(22)* aedeagus.

Froggattimyia hirta Townsend

Figs 20–22

Froggattimyia hirta Townsend, 1916:155.

Type. *Holotype* male in USNM, no. 19973, Mittagong, NSW.

For descriptive purposes I recognize 2 kinds of male: the *dark form*, with femora dark on about the basal 50%, and the *light form* with femora entirely pale (or with at most a trace of darkening). With the exception of the terminalia, other characters vary considerably within these *forms*, but morphometric analyses reveal no significant differences between them. The NSW Dept of Agriculture has 3 specimens with label data indicating that they were reared from the same batch as the holotype (it seems that W. W. Froggatt sent only one pair to Townsend for description, keeping the rest in his collection). These belong to the *dark form*, as does the holotype ("femora of male blackish on base": Townsend, 1916). I shall therefore describe that *form* first, and then the *pale form*.

Male—*dark form*. Differs from *F. wentworthi* principally as follows:

Head. fronto-orbital plate pale to mid brown dorsally. Reclinate upper orbital bristles strongly differentiated. Parafacial setulose to about level of vibrissa, setulae dark, rather small and sparse. Gena with setulae usually all dark but occasionally with extensive area of pale ones anteriorly.

Thorax. Postpronotal lobe with distinctive pale brown ground colour; notopleural (usually), supra-alar, postalar, and presutural areas likewise, forming an irregular pale brown margin to the mesoscutum; scutellum also pale brown. Mesoscutum often with at least a trace of a presutural median dark vitta. Scutellum with apical bristles usually lacking or vestigial, or (rarely) developed but small. Pleuron generally dark, but often a little paler dorsally across katepisternum and posterodorsally on anepisternum; silver-grey pollen very thin and inconspicuous. Proepisternal setulae pale and postpronotum with some fine pale hairs towards ventral margin; otherwise, pleural hairs and setulae usually all dark, but sometimes with "crinkly-tipped", pale brown hairs posteriorly on anepisternum, dorsally on katepisternum, and over katepimeron and anepimeron. Meropleural bristles all dark in main row, but sometimes a few of the secondary ones pale.

Legs. Coxae at least partly darkened. All femora with basal 40–60% dark. Foretibia with 0–1 *p* seta. Midfemur without stout spine(s) at centre of anterior surface. Midfemur usually with 1–2 smaller *ad* bristles basad to the subcentral one.

Abdomen. Setae and setulae on tergites and sternites all dark. Syntergite 1+2 and tergite 3 almost always without differentiated submedian bristles. tergites 3 and 4 with ground colour broadly pale laterally, syntergite 1+2 and tergite 5 narrowly pale laterally, leaving a dark vitta on about ¼–⅓ width of tergites; pollinosity mostly silvery to pale golden, often slightly darker on a pair of submedian triangles on tergite 3, dark median vitta on tergite 3 (and sometimes tergite 4) usually enclosed in a posteriorly directed, somewhat lighter triangle.

Terminalia (Figs 20–22). In lateral view surstyli and cerci relatively stout and tapering, but surstyli sometimes more digitate; in posterior view cerci apposed basally, broadly diverging and then converging again apically. Cerci with very characteristic, extremely profuse, moderately long hairs over posteromedial surfaces. Pregonite more extensively haired than is usual in other species.

Male—*pale form*. As for the *dark form*, differing principally as follows:

Head. Genal setulae usually mainly pale, sometimes completely so. First flagellomere often with dark area reduced (greatly so in W.A. specimens).

Thorax. Pale markings of mesoscutum and scutellum usually more conspicuous, bright yellow in very pale specimens. Pleuron with pale areas more strongly developed, in very pale specimens anepisternum and anepimeron mostly pale and pale areas present on pleurotergite and mediotergite. Pleural fine hairs and setulae mostly pale.

Legs. Coxae all or almost all pale; femora pale or (in several rather intermediate specimens) with a trace of dark basal marking.

Abdomen. Lateral pale areas of tergites rather larger; median dark non- pollinose vittae often lacking. Specimens reared from *Lophyrotoma analis* (Costa) feeding on *Rumex brownii*, all with well-developed pair of submedian marginals on tergite 3, and often on syntergite 1+2.

Female. Specimens collected along with both "pale" and "dark" males, and presumably conspecific with them, vary in colour but show no clear differentiation into distinct *forms*. Generally similar to the male, most colour patterns comprising the full range shown by *pale-* and *dark forms* combined, but differing as follows:

Genal setulae usually all pale; parafacial setulae very fine, pale, and inconspicuous on more ventral parts. Mesoscutum usually lacking the presutural median vitta. Coxae and femora all pale; midfemur with usual central cluster of 2–3 spines on anterior surface. Abdomen darker, lateral pale areas scarcely visible from above on tergite 3, not at all on other tergites. Median non-pollinose vitta often missing (abdominal pattern seemingly more variable than in male). Specimens from *Lophyrotoma analis* as for males.

Distribution. All states except NT and SA, but no doubt occurring also in the latter.

Biology. All reared specimens came from larvae of pergid sawflies; more definite identifications are *Perga affinis, P. dorsalis, Pergagrapta polita, Pterygophorus cinctus, Lophyrotoma analis* and *Lophyrotoma* sp. The last genus seems especially favoured by the *pale form*. It is perhaps noteworthy that only *F. hirta* and the related *F. coracina* have been recorded from the last 2 genera.

Notes. The above division into *pale-* and *dark forms*, based on leg colour, serves for convenience of description and recognition, but is to a large extent artificial: occasional intermediates do occur. However, male terminalia seem quite uniform and certainly no more variable than in other species, and females, although varying in colour pattern, do not cluster into distinct *forms*. There is a degree of geographic

separation between the two: the *pale form* is recorded from Queensland to Western Australia and represented in the latter state by some extremely pale specimens; the *dark form* is found mainly in Queensland and New South Wales and not recorded from Victoria or Western Australia. This might be the result of parasitising different host species or a single host that feeds on different plants. Leg colour is known to vary markedly in some other species (see *F. aurea* above).

There is also the perplexing series of the *pale form* reared from *Lophyrotoma* sp. feeding on the dock *Rumex brownii* near Brisbane (see above). Of 18 males and 6 females, all had well-developed submedian marginals on abdominal tergite 3, a condition rarely seen elsewhere. It could be that these represent a distinct, highly specialized species, but I find it more credible that larval development in a most unusual milieu is responsible. All in all, then, it seems best to recognize here just a single, variable species.

The holotype was noted by Malloch (1934) to be in very poor condition, but I have drawings of the male terminalia (kindly supplied by the late Dr C. Sabrosky). These, together with Townsend's original (1916) description and Malloch's (1934) notes leave no doubt that the species is here correctly identified. The female "type", however, as noted by Malloch (1934), is not conspecific (it is, in fact, a species of *Anagonia*). Also, the specimens from Roma, identified by Malloch (1934) as *hirta*, belong in fact to the related *F. coracina* sp. nov. (see below).

Froggattimyia coracina sp. nov.

Types. *Holotype* male in QM no. T155548; bred from *Pterygophorus analis* Costa [= *Lophyrotoma analis*], H. Tryon, Roma, Qld, 12 Feb. 1915; coll. D.A., Qld no. 576; terminalia in tube 320; condition poor. *Paratypes:— Queensland:* 1 male (badly damaged) and 1 female, same collection data as holotype (but male lacking "Col. No."); 2 females, Mingela, 21 Apr. 1955, one Norris & IFBC, the other KRN, T.t. 222; 1 female, 15°18'S 145°00'E, Isabella Creek, 32 km WNW of Cooktown, 230 m, 23 May 1977, IFBC and E. D. Edwards.

A very dark species, structurally similar to *F. hirta*, but differing as follows:

Male. *Head*. First flagellomere almost entirely dark. Parafacial setulae more profuse.

Thorax. Mesoscutum, pleuron and legs, and their hairs and setulae uniformly dark, except for brownish scutellum and postalar callus.

Abdomen. Tergites with silvery pollen, but tergite 3 and tergite 4 with narrow, apical bands and narrow, incomplete median vittae of brownish pollen.

Terminalia. Holotype with posterointernal setae on the cerci even more profuse than is usual in *hirta*; also, cerci perhaps of a slightly different shape, but this difficult to determine.

Female. Essentially similar to male, but a slightly paler ground colour barely visible under pollinosity of postpronotal lobe; also, apices of femora very narrowly pale.

Distribution. Known only from Queensland.

Biology. The holotype and two others were reared from sawfly larvae of genus *Pterygophorus*.

Notes. This might be considered a hypermelanic form of *F. hirta*, but the differences are striking and, in abdominal pattern and colour of female legs, qualitative. The completely dark pleuron and pleural vestiture, combined with the profusely setulose parafacial, are immediately diagnostic.

This species includes the specimens reared from *Pterygophorus analis* and placed in *F. hirta* by Malloch (1934). The species name is from the Latin "coracinus" meaning raven-like.

Froggattimyia sp. near *hirta*

I have a single female specimen that resembles *hirta* in the pale ground colour of the postpronotal lobe, but differs in having the parafacial setulose on the dorsal quarter only (as, e.g., in *F. aurea*); also in having tergite 5 entirely pale in ground colour, tergite 3 with a pair of submedian marginal setae, and the scutellum with moderately large apical setae.

This seems likely to represent a new species, but further material, including males, will be required to confirm this.

Specimen examined. Queensland, bred ex sawfly, 8 Jun. 1945. A. R. Brimblecombe (BMNH); CIE collection no. 18168.

Genus *Anagonia*

Anagonia Brauer & Bergenstamm, 1891:348. Type species *Anagonia spylosioides* Brauer & Bergenstamm, 1891 (= *Masicera rufifacies* Macquart, 1847) by original designation and monotypy.

Acephana Townsend, 1916:153. Type species *Masicera rubrifrons* Macquart, 1847 (= *Masicera rufifacies* Macquart, 1847) by original designation.

Opsophana Townsend, 1916:153. Type species *Masicera rufifacies* Macquart, 1847, by original designation.

All synonymy by Crosskey, 1966:95.

The diagnosis is given in the foregoing key.

Identification of species of *Anagonia*

Females of most species are unrecognized or cannot at present be accurately identified, although a few bear distinctive attributes that link them to the male. For males, the variability of most attributes makes it very difficult to produce a sufficiently accurate, conventional key for their identification. Some characters, too, need a little experience; e.g., whether an eye is haired or not, or whether the tibiae are paler than the femora; and some are often badly preserved. I have tried to catch any leakage over such couplets by multiple entries and the key given below will normally give the correct identification. However, complete confidence will always require the examination of the terminalia, which is required in any case for a few species.The male of *A. grisea* is unknown and excluded from this key (see p. 192).

Key to males of *Anagonia*

1 Eye profusely haired, or if moderately so, hairiness widely distributed; ocellar bristles inconspicuous or absent; tibiae often paler than femora 2

—— Eye hairs absent or very sparse and inconspicuous and/or ocellar setae well developed 6

2 Tergite 4 with 1 or more stout discal bristles; intrapostalar bristles finely differentiated on one or both sides ..... *A. lasiophthalma* Malloch

—— Tergite 4 without discal bristles; intrapostalar usually not developed 3

3 Abdominal tergite 3 with submedian pair of marginal bristles finely developed or absent 4

—— Tergite 3 with submedian marginals well developed 5

4 Presutural intra-alar bristle very fine or absent on both sides; upper occiput with mainly dark scales ..... *A. perplexa* sp. nov. (in part)

—— Presutural intra-alar bristle well developed on one, usually both, sides; upper occiput with mainly pale scales ..... *A. loripes* sp. nov. (in part)

5 Terminalia as in Figs 23–26; cerci in lateral view diagonally truncate at apex and longer than vertical height of syntergosternite 6–8; eye conspicuously hairy in specimens from cooler climates ..... *A. rufifacies* Macquart

—— Terminalia as in Figs 30, 31; cerci in lateral view almost mammiliform, with rounded apex, and no longer than vertical height of syntergosternite 6–8; eye often only moderately haired ..... *A. conformis* sp. nov. (in part)

6 Foretarsi with all or most segments conspicuously pale brown ..... *A. tillyardi* Malloch

—— Foretarsomeres dark brown or black 7

7 Ocellar bristles strongly developed; legs dark, tibiae concolorous with femora; tergite 3 with strongly developed pair of submedian marginal bristles 8

—— Without this combination of attributes; ocellar bristles at most weakly developed 9

8 Presutural intra-alar bristles usually undifferentiated; intrapostalar absent; tergite 5 with small discal bristles ..... *A. opaca* Malloch

—— Presutural intra-alar bristles and intrapostalar bristle clearly differentiated; tergite 5 without discal bristles ..... *A. zentae* sp. nov.

9 Abdomen in glancing posterior view intensely silver-pollinose with black spots around hair bases; thorax usually lacking presutural median vitta; (hindtibia with *pd1* clearly as long as or longer than *sdd*) ..... *A. major* Malloch

—— Abdomen in posterior view with brownish sublateral patches; thorax usually with distinct presutural median vitta 10

10 Abdominal tergite 3 with submedian marginal bristles clearly differentiated, longer than adjacent bristles 11

—— Tergite 3 with submedian marginals scarcely or not at all differentiated or extremely short 16

11 Presutural intra-alar bristle very fine or absent on both sides 12

—— Presutural intra-alar well developed on at least one side 13

12 Tibiae slightly, but distinctly, paler than femora; usually only 2 post-ocellar bristles; frons/head width less than 0.2 ..... *A. angustifrons* sp. nov. (in part)

—— Tibiae dark, concolorous with femora; usually more than 2 post-ocellar bristles; ratio frons/head width greater than 0.2; ..... *A. similis* sp. nov.

13 Hindtibia with *Pd1* bristle clearly as long as or longer than *Sdd* 25

—— Hindtibia with *Pd1* scarcely as long as, or clearly shorter than *Sdd* 14

14 Intrapostalar bristle well differentiated on at least one side, usually both 15

—— Intrapostalar bristle weakly or not at all differentiated 5

15 Tibiae dark, concolorous with femora; terminalia as in Figs 69–71 ..... *A. lateralis* Macquart

—— Tibiae at least a little paler than femora; terminalia as in Figs 47–49; ..... *A. dayi* sp. nov. (in part)

16 Presutural intra-alar bristles well developed on at least one side (usually both) 17

—— Presutural intra-alar bristles very fine or absent on both sides 30

17 Upper occiput with hairs all or mostly pale 18

—— Upper occiput with hairs all or mostly dark 21

18 Intrapostalar bristle well differentiated on at least one side ..... *A. commoni* sp. nov.

—— Intrapostalar bristle at most very weakly differentiated 19

19 Hindtibia with *Pd1* clearly longer than *Sdd*; tibiae dark, concolorous with femora; apical *ad* spine on foretibia often very small or vestigial ..... *A. anguliventris* Malloch (in part)

—— Hindtibia with *Pd1* shorter than *Sdd*; tibiae usually at least slightly paler than femora; *ad* spine on foretibia normal 20

20 Tibiae brown, at least slightly paler than femora; eye at least slightly haired; ..... *A. loripes* sp. nov. (in part)

—— Tibiae black, concolorous with femora; eye scarcely or not at all haired ..... *A. norrisi* sp. nov. (in part)

21 Foretibia with *ad* spine more or less vestigial ..... *A. anguliventris* Malloch (in part)

—— Foretibia with *ad* spine clearly developed 22

22 Intrapostalar bristle not differentiated 23

—— Intrapostalar bristle at least weakly differentiated 28

23 Hindtibia with *Pd1* bristle clearly longer then *Sdd*; (scutellum usually with apical bristles straight or slightly downcurved, parallel or divergent) 24

—— Hindtibia with *Pd1* bristle scarcely as long as, or (usually) distinctly shorter than *Sdd*; (apical scutellar bristles upcurved or at least directed upwards) 25

24 Terminalia as in Figs 35, 36 ..... *A. propinqua* sp. nov.

—— Terminalia as in Figs 32–34 ..... *A. scutellata* Malloch

25 Tibiae usually paler than femora; eye usually at least slightly haired ..... *A. conformis* sp. nov. (in part)

—— Tibiae dark, concolorous with femora; eye scarcely or not at all haired 26

26 Apical scutellar bristles upcurved 27

—— Apical scutellar bristles more or less horizontal; terminalia as in Figs 61–63 ..... *A. latistylus* sp. nov.

27 Terminalia as in Figs 66–68 ..... *A. uptoni* sp. nov. (in part)

—— Terminalia as in Figs 58–60 ..... *A. norrisi* sp. nov. (in part)

28 Hindtibia with *Pd1* bristle clearly longer than *Sdd* ..... *A. crosskeyi* sp. nov.

—— Hindtibia with *Pd1* no longer than *Sdd* ..... *A. dayi* sp. nov. (in part)

29 Upper occiput with mainly pale scales ..... *A. norrisi* sp. nov. (in part)

—— Upper occiput with mainly dark scales 30

30 Tibiae at least slightly, but distinctly, paler than femora 31

—— Tibiae dark, concolorous with femora 32

31 Terminalia as in Figs 64, 65; ratio *Frw/Hdw* 0.1–0.2 ..... *A. angustifrons* sp. nov. (in part)

—— Terminalia as in Fig. 78; ratio *Frw/Hdw* 0.2–0.3 ..... *A. perplexa* sp. nov. (in part)

32 Intrapostalar bristle small but distinct; terminalia as in Fig. 76 ..... *A. teratostylus* sp. nov.

—— Intrapostalar bristle not differentiated; apical scutellar bristles upcurved or at least directed upwards 33

33 Surstylus lacking anteriorly-directed apical hook or spine (Fig. 78) ..... *A. perplexa* sp. nov. (in part)

—— Surstylus with a minute apically-directed or anteromedially-directed hook or spine (Figs. 79, 80) 34

34 Surstylus 1.5 times or less than length of syncercus (Figs 66, 67, 79) ..... *A. uptoni* sp. nov. (in part)

—— Surstylus 2 or more times as long as syncercus (Figs 56, 57, 77, 80) 35

35 Posterior margin of surstylus with distinct angle (Figs 66, 67, 77) ..... *A. minor* sp. nov.

—— Posterior margin of surstylus more evenly rounded (Fig. 80) ..... *A. errator* sp. nov.

Anagonia rufifacies species group

The group comprises 3 species, similar in their relatively large size, tibiae usually somewhat paler than femora, and eyes usually distinctly (sometimes profusely) haired. Also, scutellum usually relatively short, with *Sbs/Ssa* averaging 3.0 or more, apical scutellar setae usually upcurved, and male terminalia with moderate to large epiphallus.

Anagonia rufifacies (Macquart)

Figs 23–26, 82

Masicera rufifacies Macquart, 1847: 87.
Masicera rubrifrons Macquart, 1847: 85.
Anagonia spylosioides Brauer & Bergenstamm, 1891: 349.

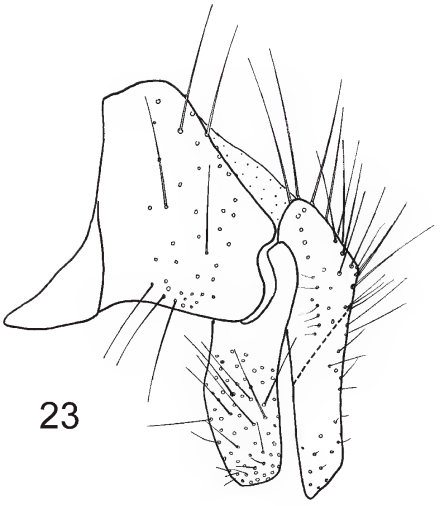
Type. *Holotype* male in BMNH, Tasmania.

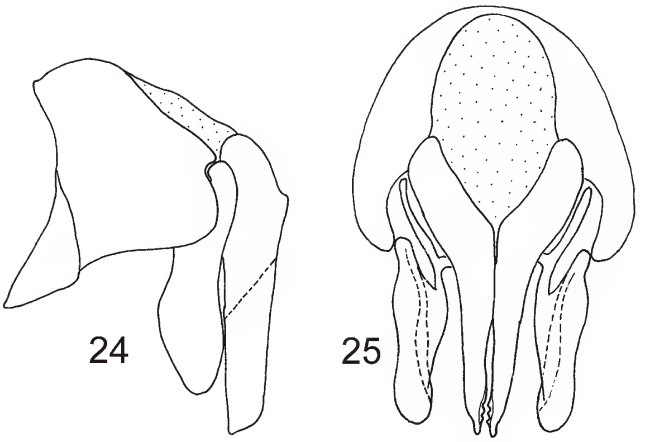
Synonymy by Crosskey, 1966:99.

There is considerable variability in the "hairiness" and colour of males, to such an extent as to throw doubt on the conspecificity of the extreme variants. However, I see no need to invoke more than a single species (see "Discussion" below). I describe below, first, the dark, "hairy" form, which is very common and to which the type specimen belongs. It is found typically at higher elevations and in cooler climates. I then describe the differences in the paler "non-hairy" form, found mainly in less elevated, drier and warmer climates. I must stress, though, that although many specimens conform to one or the other description, intermediates are common, failing in from one to a few attributes.

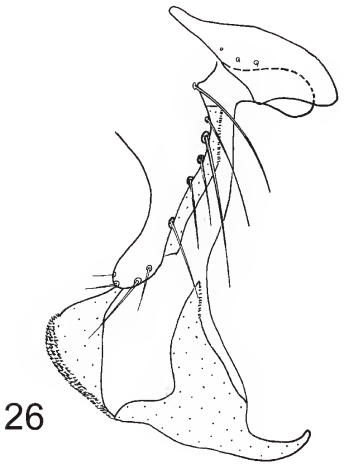
Male—*dark form*. Ground colour of integument largely dark brown to black, except on scutellum, tibiae, anteriorly on head, and laterally on abdomen. Bristles and hairs all dark, except for soft white hairs on occipital and postgular regions of head.

Head. Width 2.5–3.3, mean 3.0 mm, about 5 times as wide as frons, ratio *Frw/Hdw*, mean 0.19; ratio *Gnw/Eyh* 0.3–0.4, mean 0.35; *Ivb/Vb-E* 0.9–1.4, mean 1.3. Eye conspicuously haired. Fronto-orbital plate dark in ground colour; parafacial similar but often paler along anterior margins, sometimes completely pale; genae and face mid brown; all with thin





Figs 23–26. *Anagonia rufifacies*, male terminalia, *(23, 24)* lateral, and *(25)* posterior views, *(26)* aedeagus.



silvery or pale golden frosting; postorbital stripe silvery in lateral view, sometimes apparently discontinued at about mid height of eye. Scape and pedicel brown, first flagellomere black, with brown or dark brown arista; aristomeres 2 and 3 with light silvery frosting. Reclinate upper frontal hairs rather erect, their tips often crossing only slightly or not at all; the more dorsal members (not to be confused with the reclinate upper orbitals) often very fine, scarcely or not at all differentiated from adjacent soft hairs. One or 2 pairs of reclinate upper orbital bristles in line with reclinate upper frontal bristles; outer vertical bristles not differentiated; inner vertical bristles slightly reclinate. Soft hairs of fronto-orbital plate and vertex profuse, relatively long, and many with sharply curved tips. Ocellar bristles almost always undifferentiated; postocellar bristles 2, erect but with fine proclinate tips. Upper occiput with hairs in the postocular row relatively long and of roughly uniform length (although becoming shorter laterally), behind them 1–3 rows of short dark hairs. Parafacial completely haired, the hairs profuse, dark, and relatively long.

Thorax. Mesonotal pollen sometimes with purplish tinge; presutural median dark vitta present, usually not reaching suture. Fine hairs profuse and relatively long; notopleural area more or less completely setulose; presutural intra-alar bristle sometimes rather fine, but almost always present; postsutural intra-alar bristles normal; intrapostalar bristle not developed. Scutellum relatively broad at base, *Sbs/Ssa* 2.7–3.6, mean 3.05, usually brown, with diffusely darkened strip across base and small paler area at apex; apical setae usually diverging or parallel, almost always upcurved or, if straight, directed strongly upwards, fine (at longest, still conspicuously shorter and finer than preapicals). Pleuron with ground colour and all bristles and hairs (including proepisternal hairs) dark brown to black.

Legs. Dark brown, except for tibiae, which are almost invariably at least a little paler than femora, usually clearly so (suitable lighting angle may be required). Foretibia with poorly differentiated row of some 3–6 small *ad* spines on basal half; preapical *ad* bristle quite variable, from conspicuously shorter and finer than *d* bristle up to almost as stout and 0.8 times as long. Midtibia with 1–2 smaller *ad* bristles basad of stout subcentral one. Hindtibia with *ad* comb bristles close set, relatively long, fine, and regular, except for 2–4 longer ones (1 subcentral and 1 preapical); the subcentral *pd* bristle (*pd1*) placed at apex of a row comprising 1 shorter hair and several much shorter ones; *pd1* itself shorter than distance from its base to that of preapical *d* bristle, ratio *Pd1/Sdd* 0.6–0.9, mean 0.80.

Wing. Membrane grey, sometimes very lightly infuscated near the wing base, veins brown. Tegula dark brown to black; basicosta mid brown to dark brown, the two concolorous or (sometimes) the former rather darker than the latter. Calypters usually brownish, occasionally paler; hairs at junction of calypters usually brown, sometimes golden.

Abdomen. Ground colour (sometimes obscurely) paler laterally on a posterior strip of syntergite 1+2, all of tergite 3, and anterior ¼–¾ of tergite 4; pale area on tergite 3 extending about half way to midline in dorsal view, that on tergite 4 somewhat smaller, both rather more extensive in ventral view. Viewed posteriorly at a low angle, tergites strongly silver-grey pollinose, except for incomplete dark median vittae on tergites 3 and 4, and sometimes tergite 5, large submedian triangles on tergite 3, and dark spots around bases of major bristles and hairs. tergite 3 with pair of well-developed submedian marginal bristles; a poorly differentiated pair often present on syntergite 1+2 also.

Terminalia (Figs 23–26). Principal features are: *(a)* syntergosternite 6–8 in lateral view longest in the dorsoventral dimension; *(b)* surstylus relatively broad, sometimes more or less parallel-sided, but usually broadest on central third, then bluntly tapering; also, from about as long as cerci to (usually) a little shorter and strongly setulose on external surface; *(c)* cerci more or less approximated in posterior view, in lateral view diagonally truncate apically, posteroapical margin usually slightly concave, apex therefore characteristically sharp-pointed; epiphallus moderate, smaller than postgonite.

Male—*pale form*. Essentially resembling the *dark form*, but with many (rarely all) of the following attributes.

Head. Gena, face, and parafacial all with pale brown ground colour, sometimes extending on to anterior parts of fronto orbits. Reclinate upper frontal bristles more strongly inclinate and cruciate, clearly differentiated right up to reclinate fronto orbitals; associated soft hairs shorter and less profuse. Second postocular row sometimes with a few pale setae, especially towards centre of head (correlates with hairiness of eye). Parafacial setulae not noticeably long or profuse. Eye moderately to sparsely haired.

Thorax. Calypters usually pale, hairs at their junction pale also.

Abdomen. Integument of tergite 3 dark on up to central ⅓; that on tergite 4 sometimes a little wider.

Female. Identified here by co-occurrence with males and general resemblance. Unlike the male, there is no obvious differentiation into *pale-* and *dark forms*. All are generally similar to the *pale form* male, except in the following:

Head. Head width 2.2–3.7 mm; frons wider, 0.25–0.30 of head width. Short hairs of dorsum of head and thorax shorter, less conspicuous.

Thorax. Scutum with stout grey dusting (or pale golden in Tasmanian specimens), presutural median vitta faint or (usually) absent. Pleuron with fine hairs all pale except on anepisternum and upper anepimeron; rarely (in large specimens) dark hairs intruding on to upper katepisternum and anterior anepimeron.

Legs. Foretibia with spines in *ad* row stouter, conspicuous. Midtibia with subcentral *ad* spine long, about as long as distance between its base and that of the apical spine. Hindtibia with *ad* row coarser, the spines less uniform in length. Wing with basicosta usually pale brown.

Abdomen. Tergites uniformly dark, without lateral pale areas. Sternite 1 with pale brown hairs.

Terminalia (Fig. 82). Segment 6 much shorter than deep; Tergite and sternite 6 well developed, the former with spiracles included within its margin; posterior margin of sternite 6 sometimes with a very slight median process bearing a few setulae. Tergite 7 large, extending to about midline in lateral view, in dorsal view its posterior margin deeply emarginate; sternite 7 with a distinctive "scoop-like" shape, its ventral margin sinuous, posteriorly forming a tapering gutter that ends in a more or less completely closed pore. Relics of tergite 8, and sternites 8 and10 distinct.

Distribution. Widespread, in all states and climates except the wet tropics.

Biology. All reared specimens came from larvae of paropsine chrysomelid beetles: *Chrysophtharta bimaculata* (Olivier), *C. variicollis* (Chapuis), *C. agricola* (Chapuis), *C. amoena* (Clark), *C. ?decolorata* (Chapuis), *Paropsis porosa* Erichson, and *Peltoschema rubiginosa* (Chapuis). The large bulk of rearings, however, are from Tasmania, where the species is a major parasite of *C. bimaculata*, itself a major pest of eucalypt forests. On the mainland, and especially in more arid areas, the principal hosts are unknown.

Notes. The variability of the males can render identifications of paler specimens somewhat insecure if based on external morphology alone. The terminalia are, however, immediately recognizable—in particular, the sharply oblique truncation of the cerci in lateral view. The shape of the female sternite 7 seems *prima facie* diagnostic, but females of several closely related species remain as yet unrecognized. Indeed, it cannot be excluded that the females described above, although associated with males in various ways, might include specimens of *A. loripes* and *A. conformis*.

Anagonia loripes sp. nov.

Figs 27–29

Types. *Holotype* male in ANIC no. 29-029362, 23 km SSE of Byrock, NSW, 5 Apr. 1976, DHC (at light); terminalia in tube 2144. *Paratypes* (all males).—*New South Wales:* 1 with same data as holotype; Warambul, Royal NP, 12 Dec. 1971, G. Daniels, MV Lamp (AM).—*Australian Capital Territory:* Blundells, Canberra, 20 Feb. 1934, T. G. Campbell; Black Mtn, light trap, 26 Jan. 1967, IFBC, T.t. 294.—*Western Australia:* 18 mi W of Mogumber, 13 Apr. 1968, IFBC & MSU, T.t. 354; 19 mi WSW of Carnamah, 16 Apr. 1968, IFBC & MSU, T.t. 336; Kalbarri NP, 54 mi N of Northampton, 19 Apr. 1968, IFBC & MSU; 4 specs.: 18°27'S 123°03'E, 10 km ESE of Broome, 20 Aug. 1976, IFBC, T.t. 2110, 2113, 2121, 2122.—*Queensland:* Lockerbie, 6–10 Jun. 1969, G. B. Monteith (UQIC).

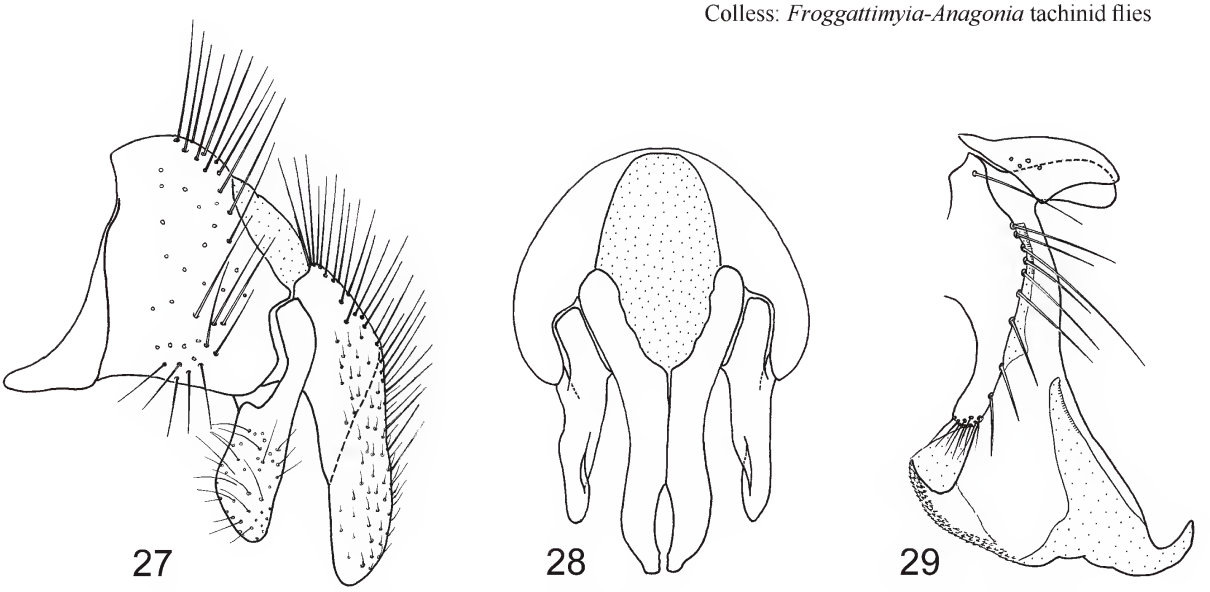
Male. Very similar to the *pale form* of *A. rufifacies*, differing as follows:

Head. Upper occiput with setae behind postocular row more frequently, and more extensively pale. Eye very sparsely or not at all haired.

Abdomen. Tergite 3 with submedian marginal pair of bristles usually finely developed or absent.

Terminalia (Figs 27–29). Cerci in lateral view usually 3–4 times as long as their greatest breadth, bluntly rounded at apex, with anterior margin more or less straight, posterior margin evenly curved; in posterior view separated on about apical ¼, rejoining at the apex, which has a series of small internal teeth; surstyli diagonally truncate, with rounded apex posteriorly, usually distinctly shorter than cerci; epiphallus large, comparable in size with postgonite.

Female. Four females taken at light along with males of *A. loripes* have very reduced hairing of the eyes, and one has dark tibiae. Otherwise they show no obvious difference from females of *A. rufifacies*.



Figs 27–29. *Anagonia loripes* sp. nov., male terminalia, *(27)* lateral, and *(28)* posterior views, *(29)* aedeagus.

Distribution. Most specimens seen came from WA, but ACT, NSW, and Qld are also represented.

Biology. Specimens of known provenance are all from light traps.

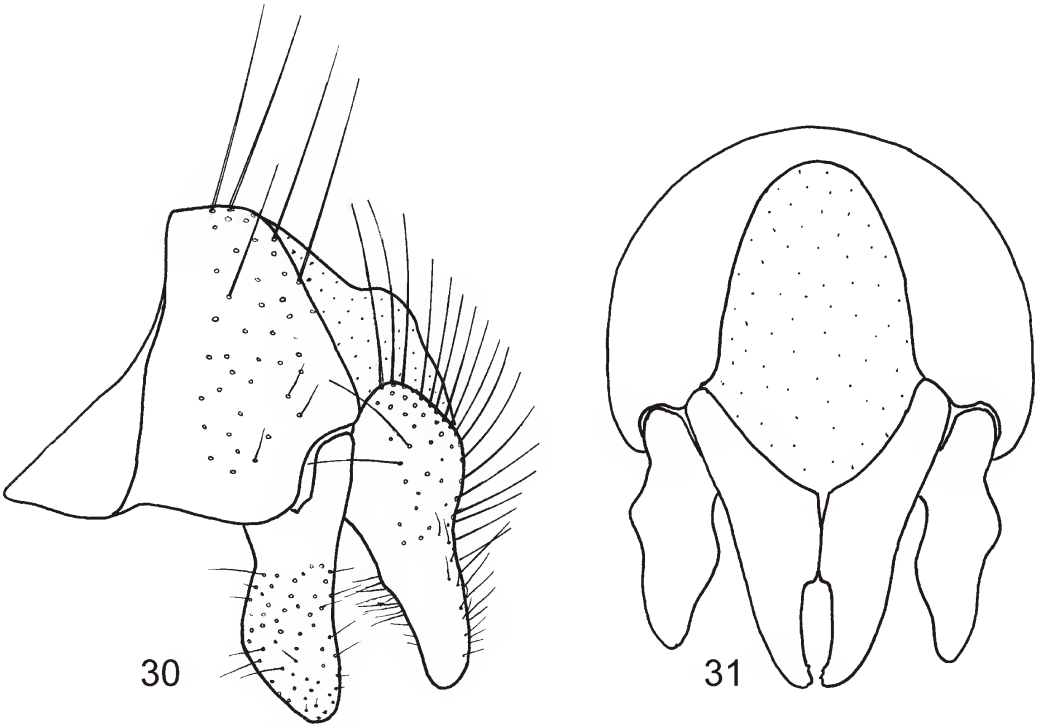
Notes. Despite the close similarity to *A. rufifacies*, this is clearly a good species. The differences in male terminalia are striking and consistent. Three males from Mt. Garnet, Queensland, have the apical scutellar setae widely separated and straight, rather than upcurved, but are otherwise typical of the species.

The name is taken from the Latin for "bow-legged", referring to the posterior view of the cerci.

Anagonia conformis sp. nov.

Figs 30, 31

Types. *Holotype* male: Stony Creek, Grampians, Vic., 1100 ft. 13 Nov. 1966, IFBC & MSU; terminalia in tube 292; in ANIC no. 29-029224. *Paratypes* (all males):—*Australian Capital Territory:* Black Mtn, light trap, 28 Jan. 1957 and 16 Mar. 1968, IFBC, T.t. 20 and 396; Black Mtn, 31 Jan. 1967 and 21 Mar. 1969, IFBC, T.t. 372 and 2497; Black Mtn, Nov. 1977, B. Selman, ex *P. atomaria*, T.t. 2210; Canberra, 15 Jan. 1975, L. R. Fox (no. 53); ex *Chrysophtharta variicollis*; T.t. 3114.—*New South Wales:* Mt Kosciusko 4700 ft, 16 Apr.



Figs 30, 31. *Anagonia conformis* sp. nov., male terminalia, *(30)* lateral, and *(31)* posterior views.

1949, E. F. Riek; T.t. 54.—*Victoria:* Little Desert, 1953, F. E. Wilson, T.t. 307; Little Desert, 13 mi S of Kiata, 6 Nov. 1966, IFBC & MSU (2 specs, one T.t. 288); 26 mi NNE Orbost, 1300 feet, 6 Nov. 1969, IFBC and MSU (6 specs, T.t. 2431, 397, 403); 1 spec. data as for holotype; Barneys Creek, Grampians, 14 Nov. 1966, IFBC & MSU.—*South Australia:* 17 mi SE of Mt Gambier, 10 Nov. 1966, IFBC and MSU (2 specs, T.t. 290).—*Queensland:* 7 mi SW of Mt Garnet, 20 Apr. 1969, IFBC and MSU, 2300 ft. (3 specs, T.t. 374, 375, 408); 16°30'S 144°55'E, Desailly Ck, 10 km NW Mt Carbine, 19 May 1981, DHC; Millstream Falls, W of Ravenshoe, 25 Jun. 1971, E. F. Riek.—*Northern Territory:* Standley Chasm, 43 km SW of Alice Springs, 11 Oct. 1972, MSU (3 specs, T.t. 2129, 2130, 2137); 6.4 km SSW of Victoria River Downs, 24 Jul. 1973, L. P. Kelsey; 16°34'S 135°41'E, 14 km NW of Cape Crawford, 6 Nov. 1975, MSU, T.t. 464.—*Western Australia:* 19 mi W of Watheroo, 15 Apr. 1968, IFBC and MSU, T.t. 342; Mt Ragged, 31 Oct. 1977, DHC (at light), T.t. 2227; 34°15'S 116°10'E, Manjimup, 19 Mar. 2001, A. D. Loch, ex *Chrysophtharta variicollis* larva on *Eucalyptus* sp, T.t. 2494; 14°19'S 126°49'E, Carson Escarpment, 15 Aug. 1975, IFBC and MSU, T.t. 461; 14°49'E 126°49'E, Carson Escarpment, 9–15 Aug. 1975, IFBC and MSU (9 specs, T.t. 452, 453, 454, 455, 456, 2138, 2139, 2142, 2390).

Male. Extremely similar to that of *A. rufifacies*, with analogous *pale form* from lower altitudes and warmer climates, and *dark form* from higher, cooler localities; former with hairing of eye rather less profuse, reclinate upper frontal hairs less erect, and soft hairs of the fronto-orbits rather shorter than in *A. rufifacies*; both forms with tibiae sometimes completely dark.

Terminalia (Figs 30, 31). Cerci in lateral view rather short and stout, 2–3 times as long as greatest breadth, rather uniformly tapering and digitate, with rounded apex, in posterior view usually distinctly forcipate, without obvious apicointernal teeth; surstyli diagonally truncate anteriorly, from a little longer to a little shorter than cerci; epiphallus large, as in *A. loripes*.

Female. Females taken at light along with males of *A. conformis* seem identical with those of *A. rufifacies*.

Distribution. Known only from all mainland states and territories.

Biology. Two specimens were reared from *Paropsis atomaria* and *Chrysophtharta variicollis*. The rest were all taken at light.

Notes. As with the previous species, separation from *A. rufifacies* is difficult, indeed, not really possible without examining the terminalia. The name is from the Latin for "similar".

Anagonia tillyardi species group

The three, perhaps four, species grouped here are exceedingly alike; the male terminalia are characteristic for the group but differ amongst themselves in at most slight details. All have *Pd1* conspicuously greater than *Sdd* (rare in other species) and epiphallus of moderate size.

Anagonia tillyardi (Malloch) comb. nov.

Figs 32–34, 83

Froggattimyia tillyardi Malloch, 1934:6

Type. *Holotype* male in ANIC, no. 5886, Blundell's, ACT.

Male. Moderate to small in size. Generally resembling the *dark form* of *A. rufifacies*, differing as follows:

Head. Width 2.2–3.2, mean 2.7 mm, *Frw/Hdw* 0.2–0.3, mean 0.19; *Gnw/Eyh* 0.2–0.3, mean 0.22; *Ivb/Vb-E* 1.0–1.4, mean 1.2; *Frw* almost always a little less than *Gnw*, ratio 0.8–1.0, mean 0.9. Parafacial pale brown, but with a dark band of variable extent along the eye margins, and moderately profuse setulae, short on the dorsal half. Reclinate upper frontal hairs all well differentiated, inclinate, mostly cruciate; soft hairs relatively short, straight, or gently inclinate. Eye at most very sparsely haired, mainly on ventral parts. Ocellar hairs almost always differentiated, but fine.

Thorax. Median dark vitta highly variable, occasionally lacking, usually at least partly developed before and/or after the suture. Presutural dorsocentral bristles with 3 (or 4) on at least one side in about 40 % of specimens. Intrapostalar seta almost always present, but extremely fine, barely differentiated. Scutellum relatively narrower at base, *Sbs/Ssa* 2.5–3.0; mean 2.74, apicals straight, directed from slightly upwards to slightly downwards.

Legs. Foretarsus conspicuously pale brown, usually on all segments, but on segments 1–3 only in occasional specimens from arid regions. Hind, and to a lesser extent mid, tarsi usually pale brown on at least segments 4 and 5. Foretibia with preapical *ad* spine only a little finer and shorter than the subapical *d* spine. Hindtibia with *Pd1* seta conspicuously long, ratio *Pd1/Sdd* 1.08–1.33, mean 1.22.

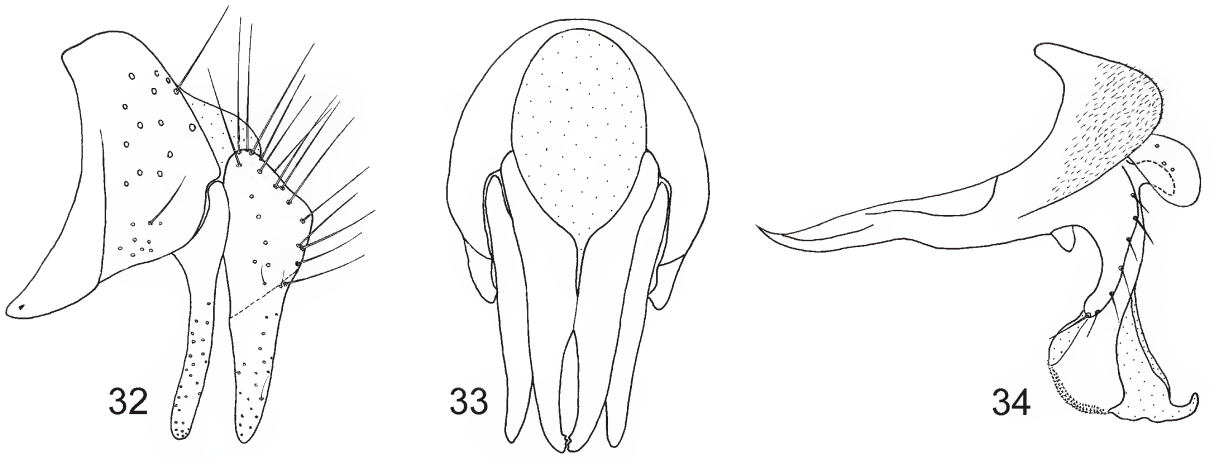
Abdomen. Tergite 3 with well-developed pair of submedian marginal bristles.

Terminalia (Figs 32–34). Characteristic features are (in lateral view) the gently tapering cerci, digitate surstyli with minute, socketed setulae on the apical ½–⅔, and (especially) the strongly microtrichiose anteroventral lobe of the hypandrium. In posterior view, surstyli only partly obscured by the cerci, their lateral margins usually visible from base to apex.

Female. Generally similar to the male, differing (as usual in the genus) in the much stouter, grey dusting of the scutum; and as follows:

Head. Frons about 0.3 of head width; gena about 0.3 of eye height; *Ivb/Vb-E* 1.2–1.7, mean 1.4.

Thorax. Prescutal median vitta of scutum usually lacking, postscutal present in about 50% of specimens. Proepisternal setulae almost always pale.



Figs 32–34. *Anagonia tillyardi*, male terminalia, *(32)* lateral, and *(33)* posterior views, *(34)* aedeagus.

Legs. Foretarsus usually brown, paler than tibia, but difference much less conspicuous than in male, best seen on posterior surface, and sometimes barely, if at all, perceptible (especially in specimens from arid areas); difference rarely perceptible on mid- and hindtarsi. Tarsal segments often (but not always!) apparently narrower than usual.

Abdomen. Tergites all dark. Tergite 5 usually with short stout spiny bristles on disc.

Terminalia (Fig. 83). Telescopic, a little longer than segment 5, intersegmental membranes between segments 6 and 7 and 7and 8 about as long as succeeding segment. Sternite 6 about twice as long as deep, its posterior margin more or less straight, with usual small median cluster of tiny setulae; tergite 6 completely divided into 2 hemitergites; both tergite and sternite very finely sclerotized laterally. Tergite 7 with narrow parallel-sided hemitergites, rounded apically, slightly expanded basally; sternite 7 elongate, with apical sclerotized part scoop-like, tapering, in lateral view slightly sinuous, with apex curved in a slight but very characteristic, dorsal direction; basal, finely sclerotized part narrowed, "handle-like"; both sternite 7 and tergite 7 with tiny curved setulae on the apical sclerotized part.

Distribution. Widespread, in all states and climates except for the wet tropics and Tasmania (I have one unconfirmed report from that state also).

Biology. Taken regularly at light, and reared from a variety of paropsine Chrysomelidae, including *Chrysophtharta variicollis, C. amoena, C. obovata, Paropsis atomaria, Chrysolina hyperici*, and *Peltoschema suturalis* (Germar).

Notes. This is certainly the species described as *F. tillyardi* by Malloch (1934). However, it remains possible that the very similar *A. scutellata*, may be an earlier synonym (see below under that species). There is also *Delta grisea* Malloch, which is not only a typical *Anagonia* (as recognized by Crosskey [1973]), but seems to have slightly paler foretarsi as in *A. tillyardi*. The name *grisea* may therefore have priority. However, the holotype of *grisea* is a female, and colours can be unreliable and hard to evaluate in such old specimens; moreover, it has the ocellar bristles quite undifferentiated, a feature that I have never seen in numerous specimens of *A. tillyardi*. I am therefore unwilling to base a synonymy on the existing evidence.

Anagonia scutellata (Malloch)

Delta scutellata Malloch, 1930:334. Synonymy by Crosskey (1973:139).

Type. *Holotype* male in ANIC [formerly in SPHTM], Mullewa, Western Australia.

Male. Exceedingly similar to *A. tillyardi* and doubtfully distinct (see below). Differs mainly in colour of tarsal segments, which are uniformly dark. No difference observed in terminalia. However, specimens other than those from ACT almost all (11/13) with 3 presutural dorsocentral bristles on at least one side and lacking the pair of submedian marginal bristles on abdominal tergite 3. Specimens from ACT rarely (5/20) with 3 presutural dorsocentral bristles and all with differentiated submedian marginals on tergite 3.

Female. Differs from *A. tillyardi* in colour and bristle characters as for the male; but indistinguishable from female of *A. propinqua* (see below).

Distribution. Widespread on the Australian mainland. I have also seen a male, apparently of this species, from Wau in Papua New Guinea.

Biology. Specimens have been reared from larvae of the chrysomelids *Liliocentris bakewelli* (Baly) and *Chrysophtharta m-fuscum* (Boheman). The remainder were taken at light.

Notes. The relatively slight difference from *A. tillyardi*, and especially the complete correspondence in fine detail of the male terminalia, suggests that *A. scutellata* cannot be maintained as a separate species. It could, perhaps, represent a variant "form", breeding in an unusual host. Even more bothersome is the possibility that this might be true of the ACT specimens, whereas the others, with their rather distinctive chaetotaxy, may comprise yet another, different species. It is certainly true that reared specimens of *A. scutellata* (one from Queensland, and a long series from ACT) are from hosts from which *A. tillyardi* has never been reared.

Principal Component analysis of head measurements (not shown) does show a degree of separation of the two species, but of no diagnostic value. The situation is intriguing, but the evidence either way inconclusive. Since there exists a

holotype male for *scutellata*—and therefore an available name—it seems best to let the matter rest there for the present.

Anagonia propinqua sp. nov.

Figs 35, 36

Types. *Holotype* male in the ANIC no. 29-029366, Black Mtn, ACT, light trap, 29 Dec. 1964, IFBC; terminalia in tube 109. *Paratypes* (all males): 3 specimens as for holotype but 27 Dec. 1962, 18 Jan. 1965, 25 Jan. 1966, T.t. 125, 107, 167, respectively; 35°30'S 150°24'E, Bawley Point, NSW, 18 Nov. 98, D. C. F. Rentz, T.t. 2158.—*Victoria:* 6 mi NW of Wedderburn, 13 Mar. 1966, MSU & J. A. Grant, T.t. 85; 26 mi NNE Orbost, 1300 feet, 6 Nov. 1969, IFBC, T.t. 405.—*South Australia:* Farina, 48 km NW of Leigh Creek, 17 Sep. 1978, MSU and R. Barrett, T.t. 2237.—*Western Australia:* 40 mi S of Balladonia, 21 Mar. 1968, IFBC & MSU, T.t. 337; Cunerdin, 9 Sep. 1986, G Hall, ex *Paropsis* larvae, T.t. 2027 (with puparium); Ludlow, 3 Dec. 1985, G. Tribe, ex larvae of *Trachymela tincticollis*, T.t. 2152; 1 km NNE of Millstream HS, 21°35'S 117°04'E, 16 Apr. 1971, MSU & Mitchell, T.t. 423.—*Queensland:* 2 spec., 7 mi SW of Mt Garnet, 20 Apr. 1969, IFBC & MSU, T.t. 376 and 2221 resp.; Darr River, 31 km NNW Longreach, 7 Apr. 1976, DHC, T.t. 2116; 15°29'S 145°16'E, Mt Cook NP, 10 May 1981, DHC (at light), T.t. 2242; 38 km S of Cunnamulla, 28 Apr. 1976, DHC (at light), T.t. 2140.—*Northern Territory:* 2 spec., Ongeva Ck, 99 km NE of Alice Springs, DHC, 13 Oct. 1978, T.t. 2200, 2216; Koongarra, 15 km E of Mt. Cahill, 6–9 Mar. 1973, DHC, T.t. 2392; Standley Chasm, 43 km SW of Alice Springs, 11 Oct. 1962, MSU, T.t. 2126.

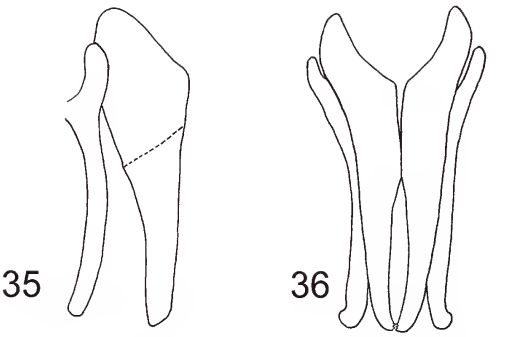
Other specimens examined: 60 males from above localities and: ACT (Blundells, Mt Ainslie, Bulls Head), NSW (Mt Kosciusko, Urunga, Coffs Harbour, Wilcannia), Vic. (Hoppers Crossing), Qld (Cooktown vicinity, Kuranda, Townsville, Biggenden, Daintree, Yeppoon, Charleville), WA (Geraldton, Collie, Dryandra, Yanchep, Pingrup, Broome), NT (Victoria River Downs, Mt Solitaire, Alice Springs vicinity, Entire Creek).

Exceedingly similar to *A. scutellata*, differing as follows:

Male. *Thorax* almost always with 3 presutural dorsocentral bristles on each side. Intrapostalar often not at all differentiated.

Abdomen. Tergite 3 with pair of submedian marginal bristles usually very finely (or not at all) developed.

Terminalia (Figs 35, 36). Differ principally in the antero-ventral lobe of the hypandrium, which is not microtrichiose but set with fine parallel ridges; also, surstyli rather longer and thinner, and (usually) largely concealed in posterior view, with their apices more obviously turned out and hook-like. Some Western Australian specimens with surstyli very long and curved.



Figs 35, 36. *Anagonia propinqua* sp. nov., male terminalia, *(35)* lateral, and *(36)* posterior views.

Female. Apparently identical to that of *A. scutellata*.

Distribution. Widespread on the Australian mainland, including the wet tropics, but not known from Tasmania.

Biology. Reared from a wide variety of chrysomelid larvae, especially paropsines, including *Chrysophtharta agricola, C. variicollis, C. flaveola* (Chapuis), *C. amoena, Paropsis aegrota* (Boisduval), *P. atomaria, Trachymela tincticollis* (Blackburn), *Phyllocharis cyanipes* (F.), and *Chalcomela* sp. Surprisingly, I have also seen two separate rearings from the curculionid *Bryachus squamicollis* Pascoe. I am aware of only one other species reared from both Curculionidae and Chrysomelidae (see *A. major*, below).

Notes. Despite the close similarity to *A. scutellata*, I have no doubt that this is a good species. The Western Australian specimens with very long and narrow surstyli are rather distinctive and might represent yet another new species, but the evidence is too equivocal for any action here. The name comes from the Latin for "near".

Anagonia grisea (Malloch)

Delta grisea Malloch, 1930:333.

Type. *Holotype* female in ANIC, Mullewa, Western Australia.

As discussed above, *grisea* is very likely a senior synonym of one of the three foregoing members of the *tillyardi* group; but, the holotype being a female, I am unable to say which.

Anagonia anguliventris species group

Includes at least two species, distinguished from others most dramatically by the gross overdevelopment of the female abdominal tergite 5, which is produced anteriorly and posteriorly to appear diamond-shaped in dorsal view, while the ovipositor is extremely long, much longer than in members of any other group. Also, in both sexes, gena relatively wide, *Pd1* seta on hindtibia extremely long; male with subapical *ad* spine on foretibia small, sometimes hardly differentiated, and scutellum relatively stout, *Sbs/Ssa* averaging about 3.2; male terminalia with epiphallus small to very small.

Considering the close similarity of the females, the males are extraordinarily different from each other, to such an extent that association with the females is difficult to accept. However, on available evidence, I see no alternative.

Anagonia anguliventris (Malloch)

Figs 37–39

Froggattimyia anguliventris Malloch, 1932:273. Synonymy by Crosskey (1973:138).

Type. *Holotype* female in USNM, Mt Stromlo, 8 Mar. 1932, Australian Capital Territory.

Male. A relatively large, dark species, generally resembling the *dark form* of *A. rufifacies* but differing as follows:

Head. Width 3.3–3.9, mean 3.60 mm; *Frw/Hdw* 0.2–0.2, mean 0.21; *Gnw/Eyh* 0.4–0.5, mean 0.42; *Ivb/Vb-E* 0.8–1.2, mean 0.93; the difference in width of frons and gena impart a distinctive shape to the head. Eye very sparsely or not at all haired. Reclinate upper frontal hairs strongly inclinate, the upper pairs cruciate. Soft hairs of fronto orbits not markedly long or profuse. Parafacial hairs short, strongly curved, profuse. Postocellar setae usually 2, but up to 7 sometimes present. Upper occipital hairs variable, with from very few to many dark hairs behind the postocular row.

Thorax. Presutural median dark vitta usually well developed, reaching to, or almost to suture; pollinosity of scutellum and adjacent mesoscutum usually with brownish tinge. Scutellum relatively broad at base (*Sbs/Ssa* 2.6–4.3, mean 3.17, the highest for the group); apical setae highly variable in shape and strength, sometimes not differentiated.

Legs. Tibiae almost always concolorous with femora, but rarely a little paler, approaching the condition in *A. rufifacies* (see "Notes" below). Hindtibia with *pd1* bristle conspicuously long (*Pd1/Sdd* 0.9–1.4, mean1.15). Foretibia with preapical *ad* bristle extremely fine, vestigial or not at all differentiated.

Wing. Tegula dark brown, basicosta brown, usually paler at centre or margin.

Abdomen. Very dark, paler areas on tergites 3 and 4 not at all conspicuous. Tergite 3 with submedian pair of marginal bristles usually not differentiated (rarely distinct in specimens from WA).

Terminalia (Figs 37–39). Remarkably small for so large a species (Fig. 37 is drawn to the same scale as Fig. 40). Surstyli about as long as cerci, both rather digitate, tapering to blunt, rounded apices; epiphallus small.

Female. Relatively large, head width 3.3–3.7 mm, mean 3.6 mm; gena (as in male) relatively broad, *Gnw/Eyh* 0.4–0.5, mean 0.43. As usual, paler than the male, with grey-dusted scutum lacking the presutural median vitta; but with the same characteristic setation of hindtibiae and abdomen; preapical *ad* bristle of foretibia rather larger, but still noticeably small. Abdominal tergite 5 lozenge-shaped, remarkably produced both anteriorly and posteriorly; shape rather variable, but length usually 1.3–1.7 times breadth.

Terminalia (see Cantrell, 1988:119). Segments greatly elongated, forming a long tubular ovipositor, about 3 times as long as tergite 5; tergite 6 largely membranous, lightly sclerotized apically; tergite 7 consisting of little more than a pair of narrow, lightly sclerotized hemitergites, sternite 7 more strongly sclerotized at apex, latter rounded, rather "scoop-like". Intersegmental membranes supported by a narrow but conspicuous, median sclerotized strip.

Distribution. Most specimens are from southern states (NSW, ACT, Victoria, South Australia, and Western Australia). I have one aberrant specimen (see above) from North Queensland, but the species seems to be at least rare in the tropics.

Biology. In the Canberra region, the species has been reared almost entirely from *Paropsis atomaria*, but a few from *Chrysophtharta variicollis* as well; whereas the few specimens from Western Australia were reared from *Paropsisterna* sp. ("*amoena*"—sic) and one from *Trachymela tincticollis*. Identified males have also been taken frequently in light traps.

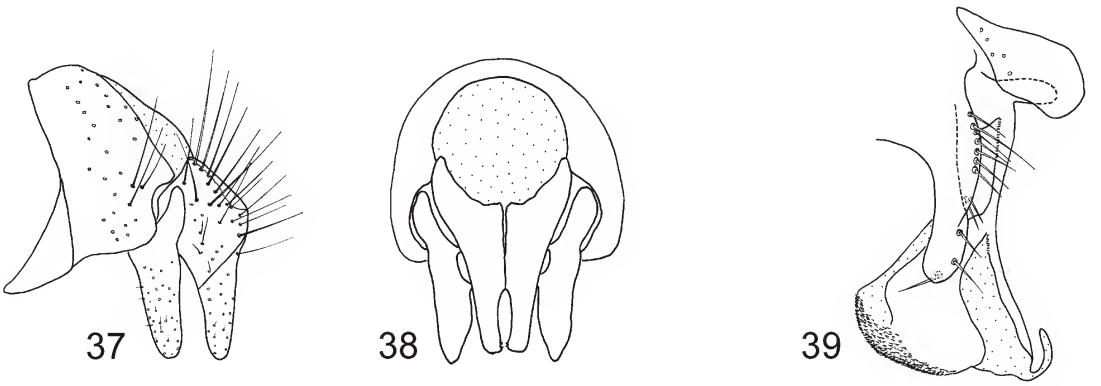
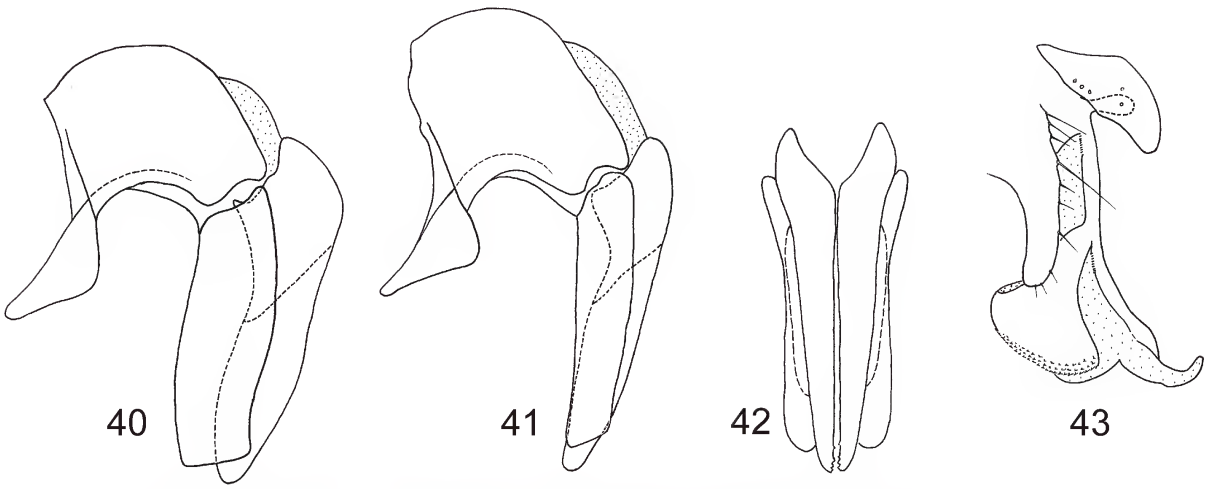


Fig. 37–39. *Anagonia anguliventris*, male terminalia, *(37)* lateral, and *(38)* posterior views, *(39)* aedeagus.



Figs 40–43. *Anagonia major*, male terminalia, *(40, 41)* lateral, and *(42)* posterior, *(43)* aedeagus.

Notes. This is certainly the species described by Malloch. I have not seen the holotype but Dr Norm Woodley has checked the crucial features for me. Also in the ANIC, there are 2 males and 2 females reared from the same batch as the holotype. Moreover, *A. major*, which has an extremely similar female, has never appeared in extensive rearings from *Paropsis atomaria*, the species from which the holotype was reared.

Despite the normally dark tibiae, I have seen several males with terminalia as described above, but with the tibiae paler than the femora; two, in particular, have the foretibia conspicuously pale and the metatarsus likewise. Two females are available, presumably of this species or the next, with aberrant setation: one with a stout pair of submedian marginals on tergite 3 and distinct intrapostalars, the other with very stout intrapostalars and tergite 5 more grossly enlarged than usual. Perhaps some of these represent distinct species; but granted the wild variability of tachinids in general, I am more inclined to regard them as simple developmental or genetic variants.

The association of the sexes is based on a large series of co-reared specimens from various dates and localities around Canberra.

Anagonia major (Malloch)

Figs 40–43

Delta major Malloch, 1930:334. Synonymy by Crosskey (1973:138).

Type. *Holotype* male in ANIC, Eccleston, Allyn River, NSW.

Male. Structurally rather similar to *A. anguliventris* but rather smaller and paler; differing as follows:

Head. Paler, fronto-orbital plate brown in ground colour, parafacial and gena pale brown, with stout silver dust. *Hdw* 2.6–3.2 mm, mean 2.94 mm; gena a little narrower on average, but still broader than in other species, *Gnw/Eyh* 0.2–0.3, mean 0.25. Reclinate upper frontal bristles usually stouter, less strongly cruciate, the upper pairs often reclinate. Postocellar setae usually 2; parafacial setulae usually fine and sparse; upper occiput rarely with at most a few dark hairs behind the postocular row.

Thorax. Strongly silver pollinose on mesoscutum and scutellum; presutural median vitta absent. Apical scutellar bristles relatively long, straight, and parallel. Proepisternal hairs sometimes pale, especially in specimens from the tropics.

Legs. Foretibia with apical *ad* bristle rarely vestigial, usually small but clearly differentiated, about 0.3–0.5 times length of adjacent *d* bristle.

Wing. Tegula brown to pale brown; basicosta pale yellowish brown.

Abdomen. Strongly silver pollinose, in posterior glancing view little or no dark area visible, presenting an almost uniform silver-grey field with strongly contrasting dark spots around seta bases.

Terminalia (Figs 40–43). Surstylus typically blade-like, more or less quadrilateral, with apex somewhat diagonally truncate (occasionally rather more elongate than those figured); cercus a little longer than surstylus, strongly tapering to a rounded apex. Shape of syntergosternite 6–8 characteristic, elongate and curving ventrad (a feature often visible in dried specimens). Epiphallus tiny, c. 0.2 of length of postgonite; pregonite lightly bristled. S5 usually with spiny bristles.

Female. No reliable differences have been found from females of *A. anguliventris*. The *A. major* specimens are, perhaps, somewhat paler on average, and some have a few pale brown hairs on the pleura; but I have found nothing of diagnostic value.

Distribution. From all states and territories except Tasmania. Unlike the preceding and very similar species, it is common in the tropics.

Biology. Commonly taken in light traps. In Western Australia, reared from *Trachymela tincticollis* and *Paropsisterna picta;* also, and most unusually, from a curculionid, *Gonipterus* sp. (the latter a single specimen only, but from a reliable source).

Notes. The sexes were associated on the basis of a small but convincing series co-reared from Perth. It is extraordinary that two species (this and *anguliventris*) can be so similar—

indeed, virtually indistinguishable as females—while differing so markedly in their male terminalia.

Malloch's allotype is an *Anagonia*, but not *major*. I cannot identify it further.

Anagonia lasiophthalma species group

Includes 4 species grouped principally by the remarkable development of sternite 7 of the female terminalia, as a sharp-pointed, highly sclerotized, downcurved "piercer". This device is no doubt adapted in some way to the host, which (for 3 species at least) is the larva of a curculionid beetle (*Gonipterus* and *Oxyops* spp). In all but *A. zentae* the tibiae are usually paler than the femora and the foretibia has the subapical *ad* bristle differentiated but small; also, in all 4, the apical scutellar bristles, although variable in some species, are usually upcurved and, in all but *A. lasiophthalma, Pd1* on hindtibia is (on average) very short. In all but *A. dayi* the scutellum is rather narrow basally, ratio *Sbs/Ssa* averaging about 2.2–2.5, but the difference is scarcely diagnostic. In the male terminalia, all but *A. zentae* have the cerci with a rather larger set of internoapical teeth than is usual. The species are, however, otherwise remarkably disparate, and one cannot exclude the possibility of convergent development of the piercer. A very similar structure occurs elsewhere in Tachinidae; e.g., the Nearctic genera, *Phorocera*, subgenus *Pseudotachinomyia* (Wood, 1972), and *Celatoria* and *Eucelatoria* (Wood, 1985).

Anagonia lasiophthalma (Malloch)

Figs 44–46, 84

Froggattimyia lasiophthalma Malloch, 1934:6. Synonymy by Crosskey (1973:138)

Type. *Holotype* female in ANIC, no. 5887, Canberra, Australian Capital Territory.

Male. Generally resembling the *pale form* of *A. rufifacies* in colour and chaetotaxy, differing principally as follows:

Head. Width 2.6–3.4 mm, mean 2.97 mm. Frons rather narrow, *Frw/Hdw* 0.2–0.3, mean 0.20. Gena rather wide, *Gnw/Eyh* 0.2–0.3, mean 0.26. *Ivb/Vb-E* 0.9–1.1, mean 1.1. Eye strongly and conspicuously haired. Postocellar setae 2–8, almost always more than 2, usually 4 or more.

Thorax. Median dark vitta well developed, extending postsuturally more than half way to scutellum. Presutural intra-alar bristle usually fine or absent on at least one side. Intrapostalars often finely differentiated on at least one side. Apical scutellars curved or directed upward and relatively stout. Scutellum distinctly narrow basally, ratio *Sbs/Ssa* 2.2–2.6, mean 2.40.

Legs. Tibiae all pale brown. Foretibia with preapical *ad* bristle distinct but usually very small, c. 0.2 length of *d* counterpart. Hindtibia with *pd1* moderately long, ratio *Pd1/Sdd* 0.8–1.1, mean 0.97.

Wing. Basicosta and tegula various shades of brown, sometimes concolorous, but tegula usually distinctly paler.

Abdomen. Tergite 3 with pair of stout submedian marginal bristles, a finer, finer pair often on syntergite 1+2 also. Also, tergite 4 and sometimes tergite 3 with 2 or more strongly differentiated bristles on disc.

Terminalia (Figs 44–46). Cerci with very distinctive, stout posterobasal lobes and conspicuous apical medial teeth; the lobes commonly visible in the dried specimen. Also, surstyli strongly pigmented and densely pilose on their inner surfaces.

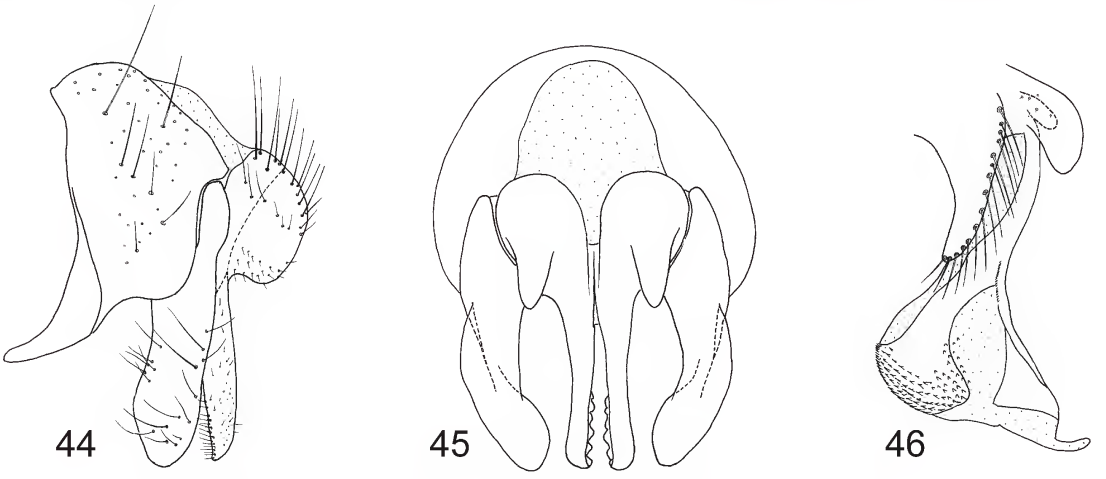
Female. Differing from the male in the usual sexual characters, and as follows:

Head. Width 3.6–4.0 mm, mean 3.72 mm. *Frw/Hdw* mean 0.2 Postgular and sometimes subcranial setae pale.

Thorax. Median dark vitta poorly developed, presutural portion usually lacking. Presutural intra-alar bristle well developed. Intrapostalar bristles usually distinct. Pleuron with soft hairs mostly pale on all but anepisternum (more obviously so than in *A. rufifacies*).

Wing. Tegula and basicosta both pale brown.

Legs. Femora and tibiae concolorous, pale to mid-brown. Hindtibia with *pd1* rather shorter, ratio *Pd1/Sdd* 0.6–0.8,



Figs 44–46. *Anagonia lasiophthalma*, male terminalia, *(44)* lateral, and *(45)* posterior views (dense pile on medial surface not shown), *(46)* aedeagus.

mean 0.76.

Abdomen. Sternite 1 with pale brown hairs.

Terminalia (Fig. 84). Tergite 6 more or less entire, slightly emarginate posteriorly; Sternite 6 in lateral view about as long as high, with stout, posteroventrally projecting, scoop-like, median boss, lined apically with several fine setae; tergite 7 completely divided, with 2 more or less crescent-shaped basal portions, the apical ⅔ represented by 2 narrow, parallel hemitergites; sternite 7 forming a conspicuous, sharp-pointed, thornlike "piercer", curved anteroventrally, emarginate basally with a group of tiny setae on each angle; dorsal membrane of tergite 7, above the piercer and enclosing the hemitergites, with a conspicuous area of tiny dark tooth-like spicules; these also extend posteriorly on to what is presumably the membranous tergite 8. More posterior parts so lightly sclerotized as to be hardly recognizable. In dried specimens, and presumably in life, the piercer is clearly visible, with its apex resting in the hollow of the median boss of sternite 6.

Distribution. Known from cooler climates in most southern states (NSW, ACT, Victoria, Tasmania, and southern Western Australia), and no doubt occurring in South Australia also. It is one of only three *Anagonia* species known from Tasmania.

Biology. Regularly taken in light traps; but a number were also reared from leaf-eating larvae of curculionid beetles —principally *Gonipterus scutellatus* (Gyllenhal), but one from *Oxyops fasciatus* Boisd. Two anomalous rearings—one from a "sawfly larva" and one from the chrysomelid *Paropsis atomaria*—are from reputable sources, but erroneous labelling cannot be excluded.

Notes. Malloch's holotype and paratype, which seem to have been co-reared, both lack the usual, well differentiated discal bristles on abdominal tergite 4, and the submedian marginal pair on tergite 3 is very finely developed. This is a very rare variant in other material. There is no doubt, however, that they are conspecific with the material described above.

The development of the extraordinary piercer seems correlated with that of the median boss on sternite 6, in that one can envisage the former arising from extreme enlargement of a sclerite resembling the latter. It might also be noted that the shape of sternite 6 is highly reminiscent of that of sternite 7 in *A. rufifacies*.

Anagonia dayi sp. nov.

Figs 47–49, 85

Types. *Holotype* male in ANIC no. 29-029226, Black Mtn, ACT, light trap, 8 Jan. 1965, IFBC. Terminalia in tube 129. *Paratypes* (all males)—*Australian Capital Territory:* 5 specs. as for holotype, but 17 Feb. 1957, T.t. 30; 6–7 Feb. 1966 T.t. 199; 26 Jan. 1967; 14 Feb. 1967; and 2 Apr. 1968; Black Mtn Peninsula, Canberra, 30 Jan. 1980, H. E. Evans, T.t. 388; Canberra, 13 May 1959, M. F. Day, ex larvae of *Gonipterus scutellaris* [sic], T.t. 97.—*New South Wales:* Bald Rock NP, 24 Nov. 1980, G. Daniels, M. A. Schneider, prey of asilid, T.t. 2186 (UQIC).—*Queensland:* Eidsvold, May–Jun. 1923, Bancroft, T.t. 31.—*South Australia:* 67 mi E of Ceduna, 3 May 1968, IFBC & MSU, T.t. 317.—*Western Australia:* 3 specs. 25 W Coolgardie, 27 Oct. 1958, E. F. Riek, T.t. 36, 53, 317; 17 mi SE of Coolgardie, 28 Apr. 1968, IFBC & MSU; 35 mi SSW of Norseman, 32°38'S 121°29'E, 17 Nov. 1969, Key & MSU, T.t. 382.

Male. Specimens from the arid region in the general vicinity of the Nullarbor Plain differ somewhat from the remainder and are described separately below, as the *western form*. Otherwise, generally resembling the *pale form* of *A. rufifacies* in colour and chaetotaxy, differing principally as follows:

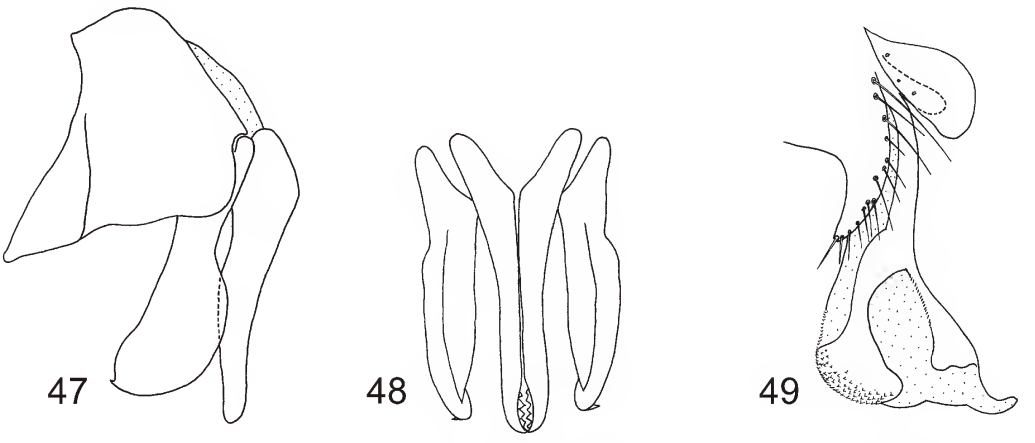
Head. Width 2.9–3.6 mm, mean 3.28 mm; *Frw/Hdw* 0.2–0.3, mean 0.25; *Ivb/Vb-E* 1.1–1.4, mean 1.15. Eye bare; reclinate upper orbital bristles discontinued well before level of ocelli (specimens from ACT only); dorsal ⅓ of occiput with at most a few scattered dark setae behind the postocular row; ocellar setae fine or (usually) absent; postocellar bristles 3–6.

Thorax. Median dark vitta usually present before and after suture; presutural intra-alar bristles and intrapostalar bristle sometimes fine, occasionally absent on one or (rarely) both sides; apical scutellar bristles more or less horizontal, usually slightly cruciate.

Legs. Tibiae pale to mid-brown, contrasting with femora. Hindtibia with *Pd1* small, *Pd1/Sdd* 0.6–0.9, mean 0.76.

Wing. Tegula concolorous with basicosta or (usually) the former a little darker.

Abdomen. Syntergite 1+2 and tergite 3 without differentiated submedian bristles; sternite 1 with pale brown hairs.



Figs 47–49. *Anagonia dayi* sp. nov., male terminalia, *(47)* lateral, and *(48)* posterior views, *(49)* aedeagus.

Terminalia (Figs 47–49). Surstylus strongly pigmented, with very characteristic shape, expanded on apical ⅔ with anteriorly directed sharp tip; with profuse long hairs on both internal and external surfaces and, especially, along posterior margin. Cerci slim, curved in posterior direction, with fairly prominent apical internal teeth.

Male—*western form*. Differs from the normal form as follows: postocellar setae almost always 2 in number; dorsal ⅓ of occiput with 2 or more rows of black setae behind the postocular row; apical scutellar setae usually upcurved; scutum often with median dark vitta fine or absent; abdomen usually with a pair of differentiated submedian bristles on tergite 3; sternite 1 with dark setae.

Female. The specimens described below are believed to be conspecific with the males, on the basis of a reared pair with identical labelling and presumably from a single batch. Apart from the usual sexual characters, differing from the male in (usually) having a finely developed pair of submedian marginal setae on abdominal tergite 3; also, rather inconspicuous pale hairs on proepisternum and katepisternum, posteroventrally on the anepimeron, and ventrally in the stigmatal area.

Terminalia (Fig. 85). Very similar to those of *A. lasiophthalma*, differing as follows: tergite 6 completely or almost completely divided into roughly triangular hemitergites; sternite 6 with stout triangular median boss posteriorly, but less strongly developed; membrane of tergite 7 with very fine, inconspicuous spicules, but those on tergite 8 coarse, thorn-like.

Distribution. The few known specimens have, remarkably, been recorded from all mainland states. The species is presumably to be found wherever there are larvae of eucalypt-defoliating curculionids.

Biology. Taken in light traps and one pair reared from larvae of the curculionid *Gonipterus scutellatus*.

Notes. The species is named for my colleague Max Day, whose many contributions to entomology include the timely lodgement of a reared pair of this species. The correlation of the sexes, as so often the case in this genus, would otherwise remain obscure.

Anagonia commoni sp. nov.

Figs 50, 51, 86

Types. *Holotype* male in ANIC no. 29-029223, Black Mtn, ACT, light trap, 17 Mar. 1958, IFBC, terminalia in tube 141. *Paratypes*: 11 males, as for holotype but 21 Jan. 1955, T.t. 142; 26 Jan. 1955, T.t. 161; 26 Feb. 1955, T.t. 49; 14 Jan. 1957, T.t. 50; 7 Jan. 1964, T.t. 123; 21 Jun. 1965, T.t. 2180; 16 Feb. 1965, T.t. 130; 3 Feb. 1967; 31 Dec. 1967; 16 Jan. 1968; 22 Apr. 1968.—*New South Wales:* Talmalmo, nr Albury, Feb. 1962, Slaney, T.t. 291, ex weevil larva.—*Western Australia:* 19 mi W of Watheroo, 15 Apr. 1968, IFBC & MSU, T.t. 322.

Male. Generally resembling the *pale form* of *A. rufifacies*, differing as follows:

Head. Eye with very sparse hairing or (usually) none; postocellar setae 2–4; upper occiput with few or (usually) no dark hairs behind the postocular row.

Thorax. Median dark vitta usually well developed, before and behind suture. Intrapostalars clearly differentiated, often stouter than usual in congeners; proepisternal hairs pale.

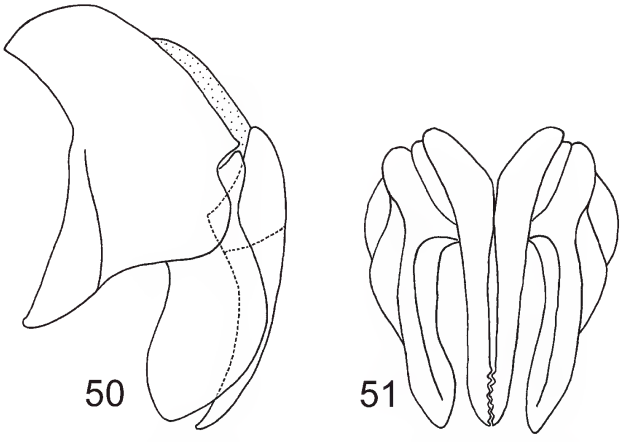
Legs. Foretibia with preapical *ad* usually 0.5–0.6 length of adjacent *d* bristle. Tibiae usually paler than femora, but difference not very striking. Hindtibia with shortest *Pd1* in the whole group: *Pd1/Sdd* 0.5–0.7, mean 0.62.

Abdomen. Syntergite 1+2 with 2–4 differentiated submedian marginals; tergite 3 with submedian marginals at most slightly differentiated.

Terminalia (Figs 50, 51). Surstyli characteristically expanded, leaf-like, with rounded apex and many short, stout bristles on both surfaces; cerci very characteristically curved in anterior direction and with substantial apicointernal teeth.

Female. Recognized on the basis of a single specimen apparently co-reared with the above male from Talmalmo. Differs from male in usual sexual characters.

Terminalia (Fig. 86). Tergite 6 as in *A. dayi*; sternite 6 with straight posterior margin, no median projection; tergite 7 with apical parallel pieces rather fine, completely separated from the strongly sclerotized basal pieces; sternite 7 more



Figs 50, 51. *Anagonia commoni* sp. nov., male terminalia, *(50)* lateral, and *(51)* posterior views.

finely developed than in two preceding species, relatively broad and not so strongly downcurved; membrane of tergites 7 and 8 finely spiculate, individual spicules resolved only with high power, but segments 6–7 with intersegmental membrane coarsely and conspicuously spiculate.

Distribution. Qld, NSW, ACT, and WA, and no doubt occurs in Vic. and SA as well.

Biology. As for the previous species, a single co-reared pair from a weevil larva (presumably *Gonipterus scutellatus*) has enabled correlation of the sexes. Other specimens were taken at light.

Notes. The species is named for my colleague, the late Dr Ian Common, whose light traps contributed so much of the material studied here.

Anagonia zentae sp. nov.

Figs 52, 53, 87

Types. *Holotype* male in ANIC no. 29-029370, Black Mtn, ACT, light trap, 25 Feb. 1966, IFBC; terminalia in tube 88. *Paratypes*:—*Australian Capital Territory:* 26 males, all as for holotype but: 23 Mar. 1960, T.t. 134; 18 Feb. 1961, T.t. 89; 31 Dec. 1961, T.t. 90; 25 Feb. 1965, T.t. 196; 6 Jan. 1965, 3 specs., T.t. 151, 168, 164; 11 Jan. 1965, T.t. 103; 22 Jan. 1965, T.t. 188; 14 Jan. 1966, T.t. 155; 3 Feb. 1966; 21 Mar. 1966, T.t. 132; 20 Dec. 1966; 2 specs., 6 Jan. 1967; 2 specs., 9 Jan. 1967; 13 Jan. 1967; 16 Jan. 1967; 2 specs., 20 Jan. 1967; 14 Feb. 1967; 27 Feb. 1967; 28 Feb. 1967; 6 Mar. 1967; 4 Jan. 1968, T.t. 297; 2 specs., 7 Jan. 1968; also 1 male each: Black Mtn, Jan. 1968, M. E. Irwin, Malaise trap.—*Western Australia:* 60 W Coolgardie, 29 Oct. 1958, E. F. Riek, T.t. 185; Millstream, 23 Oct. 1970, DHC, T.t. 432.—*Northern Territory:* Roe Ck, 12 mi SW Alice Springs, 23–28 Sep. 1972, E. F. Matthews, T.t. 429.—*South Australia:* Sleaford Bay, Oct. 1959, J. Casanova.

Other specimens: 57 putative females from various localities.

A small to medium sized species, with very dark integument and major bristles exceptionally strongly developed.

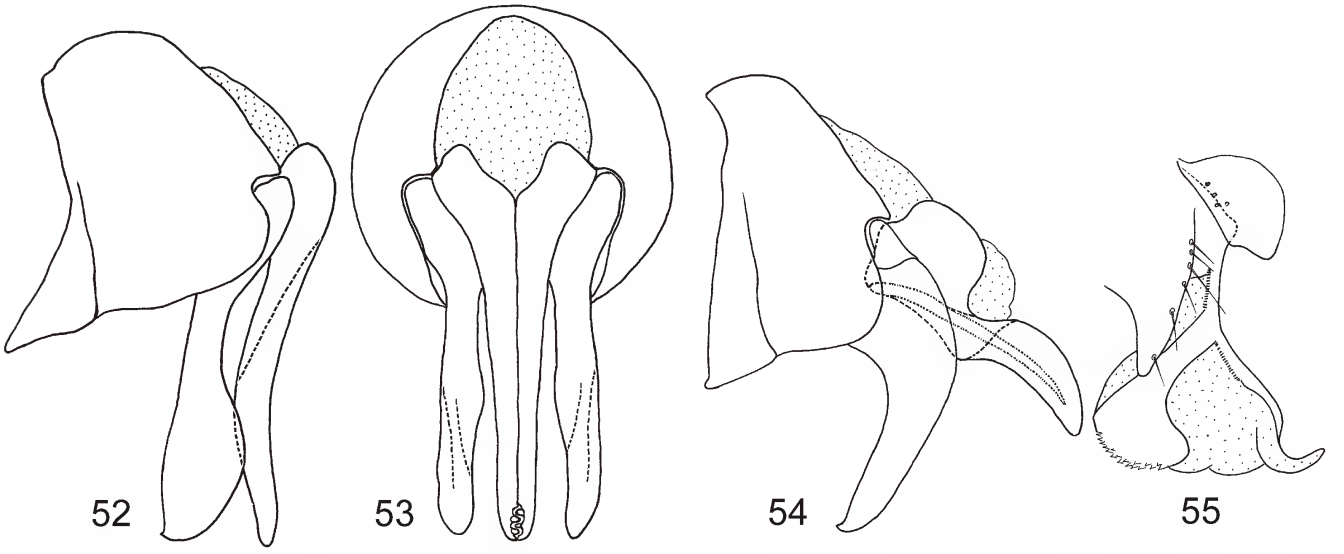
Male. *Head*. Width 1.8–2.4, mean 2.12 mm. Eye quite strongly haired in specimens from ACT but very sparsely so in those from other areas. Gena narrow, ratio *Gnw/Eyh* 0.2–0.3, mean 0.27 (the lowest for the group); parafacial also narrow, reflected in ratio *Ivb/Vb-E* 1.5–1.9, mean 1.75 (the highest for the group). Fronto-orbital plate and parafacial with very dark brown integument and silvery frosting. Ocellar bristles strongly developed. Reclinate upper frontal bristles stout and usually continuous with 2 stout reclinate orbital bristles. Upper occiput with 1–2 rows of black setae behind the postocular row, becoming 3–4 rows laterally, the pale occipital setae off-white and rather inconspicuous.

Thorax. Presutural median dark vitta variable. Presutural intra-alar bristle well developed on both sides. Intrapostalar seta well developed. Scutellum (as usual) with paler integument, but with a large dark patch on about the basal third; rather narrow basally, ratio *Sbs/Ssa* 2.2–2.9, mean 2.34 (the lowest for the group). Apical scutellar setae upcurved.

Wing. Tegula and basicosta both dark brown. Lower calypter grey-brown on about basal half.

Legs. All dark. Foretibia with preapical *ad* spine stout, about half as long as adjacent *d* spine. Hindtibia with *ad* comb coarse, of sparse, spiny setae; *Pd1* very short, ratio *Pd1/Sdd* 0.5–1.0, mean 0.75in posterior direction (often visible in dried specimens).

Terminalia (Figs 52, 53). Surstylus with slender stem and expanded, leaf-like apical half, with short, spiny setae and a sharp, anteriorly directed tip; cercus characteristically slender and curved in posterior direction (often visible in dried specimens); postgonite remarkable, almost teratological in appearance, difficult to resolve (or illustrate) but apparently rather "twisted" and spoon-like, with a stout flange on external surface.



Figs 52–55. Male terminalia. *Anagonia zentae* sp. nov., *(52)* lateral, and *(53)* posterior views. *Anagonia opaca* Malloch *(54)* lateral view, and *(55)* aedeagus.

Female. A long series of specimens closely resemble the male in provenance, chaetotaxy and colouration differing significantly as follows: eye with very sparse hairing or none at all; integument of head paler, mid-brown. Proepisternal hairs pale. Lower calypter uniformly creamy in colour. Basicosta pale brown, lighter than tegula.

Terminalia (Fig. 87). Tergite 6 completely divided; sternite 6 with a median triangular process but scarcely protruding ventrally. Tergite 7 with apical hemitergites very narrow and fine but joined to their basal sections, associated membrane finely spiculate; sternite 7 strongly curved and sclerotized, its base scarcely emarginate. Dorsal membrane of tergite 8(?) with coarse black denticles, much more conspicuous than in 2 preceding species.

Distribution. Recorded from all mainland states but Queensland, where it no doubt occurs as well.

Biology. Nothing known except that the species comes readily to light. However, the structure of the female terminalia suggests strongly that, like other members of the group, *A. zentae* also parasitizes larvae of leaf-eating curculionids.

Notes. I am fairly convinced of the above association of the sexes, based on their close similarity in many attributes and co-occurrence in light traps in Canberra. It is curious that practically all males are from Canberra, while some 30% of females came from areas of very arid semidesert. However, the latter were all taken in early spring, when males may not yet have been active.

The relationship to other members of the group seems beyond doubt, in view of the close similarity in the remarkable female terminalia. Likewise, in the male the shapes of the surstylus and cercus clearly resemble those of *A. dayi*. However, in many other features, e.g., the male ocellar bristles and postgonite, *A. zentae* is remarkably unlike most other members of the group.

The species name commemorates my friend and colleague—and tireless collector—the late Zenta Rosalia Liepa.

Anagonia opaca species group

Distinguished mainly by the male terminalia: syntergosternite 6–8 very short and declivitous and cercus clearly differentiated into a basal, usually lobate part and an apical, more or less digitate part, the whole structure distinctly shorter than the surstylus; the latter usually curved or bent in an anterior direction. Also, presutural intra-alar seta commonly lacking on at least one side and intrapostalars lacking. Diagnosis of some species depends very much on genitalic characters.

Anagonia opaca (Malloch)

Figs 54, 55, 88

Delta opaca Malloch, 1930:334.

Type. *Holotype* female in ANIC, Sydney, NSW.

A small, very dark, strongly bristled species; not especially resembling any other, but attributes not mentioned below are more or less as in the *pale form* of *A. rufifacies*.

Male. *Head*. Width 1.7–2.4, mean 1.88 mm; gena rather narrow, *Gnw/Eyh* mean 0.30; *Ivb/Vb-E* 1.3–1.8, mean 1.56. Eye bare. Ground colour of fronto-orbital plate and parafacial dark brown, almost black, of gena dark brown, all with stout silvery dust. Reclinate upper frontal bristles widely spaced, above ptilinum 4–5 in number on at least 1 side (other species with 5–10, usually 6 or more), very stout, rather erect but apically cruciate. Upper occiput with mainly black hairs, forming 1 complete row behind postocular row, plus several partial rows of scattered hairs. Ocellar bristles very stout, divergent, comparable in size to adjacent reclinate upper orbital bristles; 2–3 postocellar bristles, usually 2.

Thorax. Median dark vitta stout. Presutural intra-alar bristle almost always undifferentiated; usually 2+4 dorsocentral bristles; no intrapostalar bristle. Scutellum typically with broad basal wedge of dark colour and paler border; apical scutellar setae usually parallel, variable in strength but commonly rather fine.

Wings. Calypters usually pale, upper one sometimes grey-brown brown to black; tegula dark brown, basicosta somewhat paler.

Legs. Dark. Foretibia with preapical *ad* spine 0.5–0.8 length of adjacent *d* spine. Hindtibia with very coarse, sparse *ad* comb; *pd1* usually noticeably short, *Pd1/Sdd* 0.7–1.0, mean 0.88.

Abdomen. Very dark, pale lateral areas often restricted to tergite 3, extending at most anteriorly on to tergite 4; submedian marginal pair of bristles strongly developed on tergite 3 (rarely a fine pair on syntergite 1+2); dorsum of tergite 4 often with 1 or 2 stout discal bristles (or an anteriorly displaced marginal); bristles on tergite 5 conspicuously long and stout.

Terminalia (Figs 54, 55). Surstylus in lateral view pointed, with very characteristic anteriorly curved, sickle-like shape; cercus much shorter than surstylus; basal lobe relatively long but not very prominent, with many microtrichiae scattered amongst the setulae, about as long as apical part and separated from it by a distinct area of membrane; apical part digitate, frequently exserted as in Fig. 54. Epiphallus scarcely developed, at most a very slight prominence.

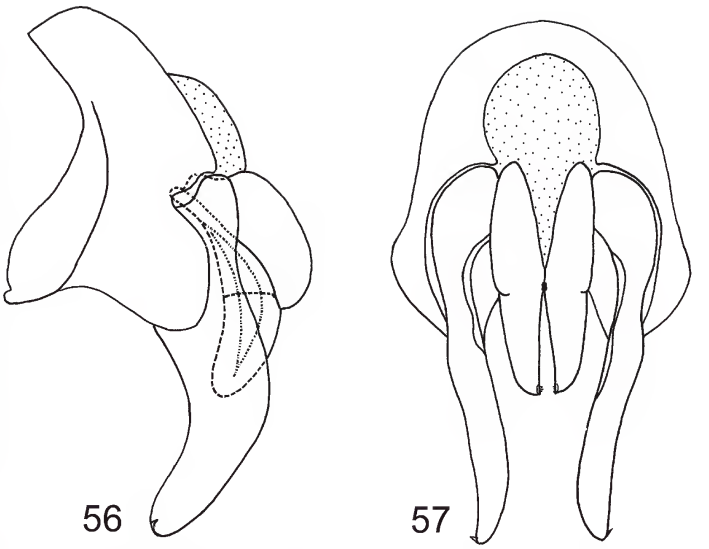
Female. Association based on co-collection, plus stout resemblance in chaetotaxy (I cannot however exclude the possible inclusion of a few specimens of some very similar species, e.g., *A. minor*). Differs from male in usual sexual characters, including paler integument, stouter silvery pollen, and median vitta of thorax usually missing. Also, reclinate upper frontal bristles above ptilinum often only 2 or 3 in number; tegula brown, basicosta pale brown.

Terminalia (Fig. 88). Tergite 6 deeply emarginate apically or completely divided; sternite 6 with small but distinct setulose median projection. Tergite 7 finely sclerotized, hemitergites more or less parallel-sided, not expanded basally; sternite 6 finely sclerotized on basal half, apical half broad in ventral view, only a little longer than wide, rounded apically; in lateral view scoop-like, with a slight but characteristic ventral deflexion.

Distribution. I have specimens from all mainland states, but none from the wet tropics.

Biology. All material was netted or taken at light. Nothing is known of the host, which is presumably a rarely investigated beetle.

Notes. A very distinctive species, especially in the male with its strongly developed ocellar bristles. The female holotype is old and fragile and I forbear to dissect its terminalia. However, I have no doubt about the identity of this species, and the association of the sexes.



Figs 56, 57. *Anagonia minor* sp. nov., male terminalia, *(56)* lateral, and *(57)* posterior views.

Anagonia teratostylus sp. nov.

Fig. 76

Types. *Holotype* male in ANIC no. 29-029368, Mt Solitaire, 30 km WNW of Alice Springs, NT, 29 Sep. 1978, MSU and R. A. Barrett, terminalia in tube 2500. *Paratypes* (all males):—*Northern Territory:* 32 km WNW of Alice Springs, 8 Oct. 1978, DHC, at light, T.t. 2230; 2 males, Entire Ck, 155 km ENE of Alice Springs, 13 Oct. 1978, DHC, T.t. 2249, 2615.—*Queensland:* Moura, F. D. Page & L. Rigby, T.t. 2614.

A small dark species. Only the male is known, practically identical to *A. opaca* in size, colouration and parameters of head shape, but rather less bristly and differing otherwise as follows:

Head. Eye moderately to sparsely haired; ocellar setae well developed, but not as stout as in *opaca*. Hindtibia with *Pd1* long, ratio *Pd1/Sdd* 1.0–1.1, mean 1.08. Abdomen without differentiated submedian marginal bristles on tergite 3.

Terminalia (Fig. 76). Syntergosternite 6–8 very narrow, its posterior margin steeply declivitous, almost vertical, its surface with extensive areas of very fine setulae. In lateral view surstylus of most unusual shape, broad and foliate on basal ⅔, with a deep subapical notch on anterior edge setting off a more or less thumb-like apical part. Cercus with basal lobe only slightly protruding, about as large as apical part, both with extensive areas of profuse, minute, fine setulae. Epiphallus well developed, tapering. Lobes of S5 with small, stout denticles instead of the usual setae.

Distribution. The few specimens from the vicinity of Alice Springs in the Northern Territory were matched, surprisingly, by one from central Queensland.

Biology. The NT specimens were taken at light.

Notes. The specific identity is guaranteed by the extraordinary terminalia, but there is little else to assist in identification. The name refers to the most unusual surstylus.

Anagonia minor sp. nov.

Figs 56, 57, 77

Types. *Holotype* male in ANIC, no. 29-029363, Black Mtn, ACT, light trap, 27 Jan. 1965, IFBC, terminalia in tube 87. *Paratypes* (all males):—*Australian Capital Territory:* 17 specs. as for holotype, but: 20 Dec. 1957, T.t. 195; 4 Jan. 1965, T.t. 198; 5 Jan. 1965, T.t. 187; 7 Jan. 1965, T.t. 199; 15 Jan. 1965, T.t. 119; 22 Jan. 1965, T.t. 117; 9 Dec. 1965, T.t. 170; 16 Dec. 1965 (2 specs.), T.t. 138 and 144; 17 Dec. 1965, T.t. 154; 22 Dec. 1965, T.t. 137p; 5 Jan. 1966 (2 specs.), T.t. 143 and 152; 17 Jan. 1966, T.t. 167; 18 Jan. 1966, T.t. 153; 20 Jan. 1966, T.t. 160; 26 Jan. 1966, T.t. 329.—*Queensland:* 15°14'S 145°07'E, 7 km N of Hopevale Mission, 4 Oct. 1980, DHC (at light), T.t. 2162; 15°02'S 145°16'E, Mt Cook NP, 10 May 1981, DHC, (at light), T.t. 2231.

A small very dark species, integument and vestiture mainly dark brown to black.

Male. *Head*. Width 1.6–2.1, mean 1.87 mm. Eye very inconspicuously haired, mainly on ventral parts. Integument of head very dark, almost black in ground colour, with stout silvery frosting. First flagellomere appearing rather shorter than usual (but I cannot find a convincing ratio to support this). Frons rather narrower than usual, *Frw/Hdw* 0.20; gena relatively narrow, *Gnw/Eyh* 0.30. Margins of face strongly diverging, parafacial therefore rather narrow, *Ivb/Vb-E* 1.4–1.7, mean 1.54. Fine hairs of vertex and front of head relatively long and profuse. Ocellar setae very finely developed; postocellar setae 2–5, usually 3 or more. Upper occiput with at least 1 row of black setulae behind postorbital setae.

Thorax. Integument dark, median vitta stout. Dorsocentral bristles 2+4; presutural intra-alar absent on at least one side, usually both; intrapostalar absent. Scutellum with c. basal half blackish, remainder dark brown; apical setae highly variable in shape.

Wing. Tegula brown to dark brown. Upper calypter dark on internal margin, remainder grey-brown on about basal ⅔, apical portion pale.

Legs. Foretibia with apical *d* spine unusually large in some specimens, 2.0–2.5 times as long as *ad* spine. Hindtibia with *pd1* usually shorter than apical *d*, ratio *Pd1/Sdd* 0.8–1.2, mean 0.96; *ad* comb rather distinctive, sparse but longer than usual in such small specimens.

Abdomen. Syntergite 1+2 sometimes with a pair of submedian marginals; those on tergite 3 usually differentiated but quite fine.

Terminalia (Figs 56, 57, 77). Strongly sclerotized, dark, especially sclerites of phallus. Structurally similar to *A. perplexa* (below). syntergosternite 6–8 similarly short and precipitate posteriorly. Curvature of surstyli rather angulate (not well brought out in the figure), its base expanded posteriorly in a fairly characteristic fashion. Cerci not exserted and short, apex falling at or somewhat short of bend of surstylus; basal lobe very conspicuous, separated from apical part by a distinct notch; apical part a little shorter than basal part, with a subapical patch of setulae. Epiphallus developed but very faintly sclerotized and seen only with careful microscopy (not at all in some specimens apparently because overlain by very dark postgonites).

Female. Not recognized; perhaps very similar to the *A. opaca* female.

Distribution. Most material taken in the ACT; two specimens from northern Queensland are available.

Biology. Nothing known except that the species enters light traps. Despite the many males taken in light traps in Canberra, I am unable to recognize the female.

Notes. Very similar in some respects to members of the *perplexa* complex (below) especially in the male terminalia, but very different in size and colour. Very similar externally to *A. opaca*, but males immediately recognizable by the finely developed ocellar bristles, and by the terminalia. The distinctively high *Ivb/Vb-E* reflects little more than overall size.

Anagonia norrisi sp. nov.

Figs 58–60

Types. *Holotype* male in ANIC no. 29-029364, Black Mtn, ACT, light trap, 6 Feb. 1967, IFBC (terminalia in situ, exserted). *Paratypes* (all males):—*Australian Capital Territory:* 18 specs. as for holotype, but 8 Feb. 1955, terminalia in tube 146; 16 Feb. 1955, T.t. 145; 13 Jan. 1960, T.t. 126; 15 Jan. 1964, T.t. 124; 10 Feb. 1964, T.t. 118; 7 Jan. 1965, T.t. 131; 5 Feb. 1965, T.t. 111; 5 Jan. 1966, T.t. 158; 20 Jan. 1966, T.t. 150; 4 Jan. 1967 (2 specs.); 5 Jan. 1967; 18 Jan. 1967; 25 Jan. 1967; 31 Jan. 1967; 9 Feb. 1967 (2 specs.); 10 Feb. 1967. Canberra, 25 Jan. 1957, P. B. Carne, T.t. 2118, emerged from larva of *Gonipterus* sp.; Black Mtn Peninsula, Canberra, 30 Jan. 1970, H. E. Evans, T.t. 393.—*New South Wales:* nr. Queanbeyan, 10 Feb. 1955, S. J. Paramonov, T.t. 35.—*Western Australia:* Fitzroy Crossing, 19 Jul. 1968, P. Ferrar, T.t. 380.

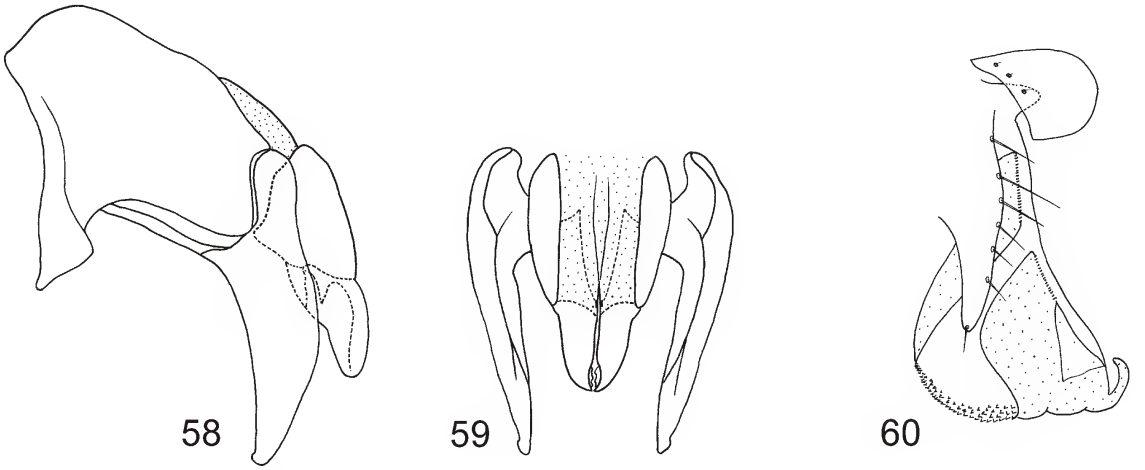
A large, rather pale species, practically identical to *A. perplexa* sp. nov. (see below), but differing as follows:

Head. Occiput with mainly pale "scales", usually at least a few in the first row of setae behind the postocular row.

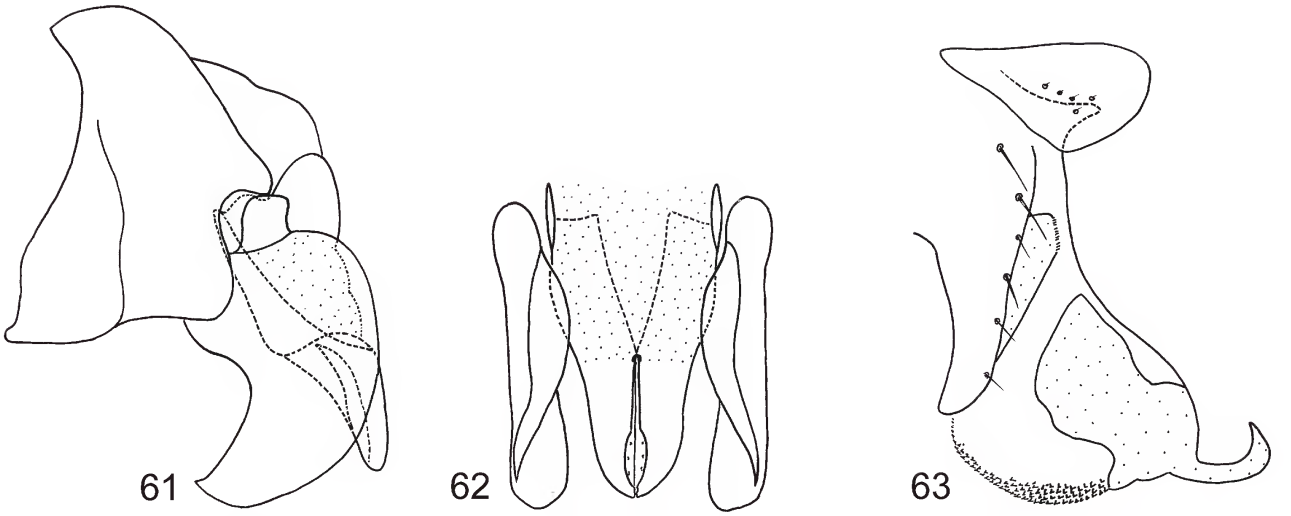
Thorax. Median vitta sometimes absent. Presutural intra-alar seta absent on at least one side in about 50% of specimens.

Terminalia (Figs 58–60). In lateral view syntergosternite 6–8 relatively long, gently sloping; surstylus falcate, with hooked tip; cercus with basal lobe not prominent, about as long as the remainder.

Distribution. Of specimens seen, all but one came from Canberra; the other (and quite typical) was from Western Australia.



Figs 58–60. *Anagonia norrisi* sp. nov., male terminalia, *(58)* lateral, and *(59)* posterior views, *(60)* aedeagus.



Figs 61–63. *Anagonia latistylus* sp. nov., male terminalia, *(61)* lateral, and *(62)* posterior views, *(63)* aedeagus.

Biology. Most specimens were taken at light, but one was reared from larvae of the weevil *Gonipterus scutellatus*.

Notes. Despite the strong external resemblance to several other species, the terminalia are quite different and the species is obviously a good one. It is dedicated to my colleague, friend, and noted dipterist, the late Dr K. R. Norris.

Anagonia latistylus sp. nov.

Figs 61–63

Types. *Holotype* male in ANIC no. 29-029361, 1 km NE of Millstream, WA, 21°35'S 17°04'E, 6 Nov. 1970, MSU & Feehan; terminalia in tube 2123. *Paratypes* (all males):—*Western Australia:* 4 specs. Millstream, 23 Oct. 1970, DHC, T.t. 430, 431, 2117, and 2125; 3 specs. as for holotype, but 1 Nov. 1970, T.t. 434, 435, and 436.—*Australian Capital Territory:* Black Mtn, light trap, 23 Jan. 1962, IFBC, T.t. 114; the same, but 15 Jan. 1965, T.t. 63, and 19 Dec. 1967, T.t. 296.

Generally resembling others in the group; more distinctive features as follows:

Male. *Head*. Width 2.3–3.0, mean 2.70 mm. Frons relatively narrow, *FrW/HdW* mean 0.18; *Ivb/Vb-E* 1.0–1.4, mean 1.17. Eye almost or entirely bare. Parafacial and much of fronto-orbital plate pale in ground colour; the former rather sparsely haired. Ocellar setae usually barely differentiated but occasionally moderate; postocellar setae 2. Upper occiput with 1–2 rows of black setulae behind postocular row.

Thorax. Median vitta usually well developed. Presutural intra-alar lacking on at least one side, usually on both.

Legs. Tibiae dark, concolorous with femora. Hindtibia with *pd1* short, ratio *Pd1/Sdd* 0.6–0.9, mean 0.83. Hindtibial *ad* comb distinctly sparse.

Abdomen. Rather noticeably pale, syntergite 1+2, tergite 3, and tergite 4 pale on lateral third. Syntergite 1+2 and tergite 3 with submedian marginal bristles not differentiated.

Terminalia (Figs 61–63). Surstylus greatly expanded, but still pointed and angled in the fashion typical of the group. Cercus structurally resembling that of *A. opaca*; basal lobe small, separated from apical part by an extensive membranous region about as long as the apical part itself; the latter thumb-like, with a central patch of setulae.

Female. Not recognized.

Distribution. ACT and northern Western Australia.

Biology. All specimens were taken at light.

Notes. The name refers to the species only really conspicuous feature, the greatly expanded surstylus. In other ways it is a quite typical member of the group. Despite its enigmatic distribution the type series is quite homogeneous and clearly represents a good species.

Anagonia perplexa complex

I am for convenience grouping here a set of 5 species from the *opaca* group that are exceedingly similar, especially in their male terminalia. The latter exhibit good and stable differences, but they involve obscure features of the cercus, mostly requiring high magnification. There are also more gross differences in colour; but these are sometimes difficult to discern and to describe.

Anagonia perplexa sp. nov.

Fig. 78

Types. *Holotype* male in ANIC no. 29-029365, 12 mi W of Pemberton, WA, 31 Mar. 1968, IFBC & MSU, terminalia in tube 346. *Paratypes* (all males):—*Western Australia:* 2 specs. as for holotype, but T.t. 319 and 345; as for holotype, but 5 Apr. 1968, T.t. 333; 15 mi SE of Donnybrook, 29 Mar. 1968, T.t. 343; 2 specs. 5 mi N of Nannup, 1 Apr. 1968, IFBC & MSU, T.t. 318 and 349.

A relatively large and pale species, but with body hairs all dark.

Male. *Head*. Width 3.0–3.2, mean 3.12 mm. Frons rather broad, *FrW/HdW* mean 0.25; *Ivb/Vb-E* 1.0–1.2, mean 1.06. Eye sparsely to moderately haired. Fronto-orbital plate with rather profuse long fine hairs. Ground colour of parafacial mainly mid- to (rarely) dark-brown, pale-brown along anterior margin; gena pale brown. Ocellar setae rather variable, from finely to moderately developed, but always distinct; postocellar setae 2 or (rarely) 3. Upper occiput with a complete row of black setae behind the postocular row and some scattered black setae behind those.

Thorax. Median vitta strongly developed. Presutural intra-alar extremely fine or not developed on at least one side, often on both. Intrapostalars lacking. Scutellum brown with narrow dark basal band; apical scutellars well developed but highly variable in shape.

Legs. Tibiae paler brown than femora, often conspicuously so. Hind tibia with *Pd1* usually a little shorter than *Sdd*, ratio 0.7–1.0, mean 0.87.

Abdomen. Colour unremarkable, as in, for instance, *A. rufifacies* (*pale form*). Submedian apical bristles on tergite 3 barely or not at all differentiated.

Terminalia (Fig. 78). Structurally, rather like a magnified version of *A. minor* (above). Cercus with prominent basal lobe, separated from apical part by a distinct "notch", with usual small stout bristles and a patch of fine microtrichiae on the margin adjacent to the notch; apical part curved, thumb-like, a little shorter than basal part, its apex about at the bend of the surstylus, with stout fine setulae over most of its posterior surface and a band of microtrichiae along the lateral surface, extending into the basal part. Surstylus rather abruptly angled, apical part narrowed. Epiphallus well developed, with pointed or rounded apex.

Female. Not known with sufficient certainty. Two specimens captured along with males at light may belong here, but the evidence is not compelling.

Distribution. All specimens came from localities in southwestern Western Australia.

Biology. Nothing known except that adults come to light.

Notes. The species is distinguished from others in the complex by the fine details of the shape and vestiture of the cercus. Its name is self-explanatory [I am not sure whether this would pass muster with the new rules].

Anagonia angustifrons sp. nov.

Figs 64, 65

Types. *Holotype* male in ANIC no. 29-029222, 26 mi NNE of Orbost, Vic., 1300 feet, 6 Nov. 1969, IFBC, terminalia mounted on card. *Paratypes* (all males):—*Australian Capital Territory:* Cotter River, 18 Nov. 1954, Z. Liepa, T.t. 106; Lee's Springs, 24 Feb. 1959, Z. Liepa, T.t. 466; Black Mtn, light trap, 20 Nov. 1959, IFBC, T.t. 121; the same, but 15 Oct. 1965, T.t. 136; as for holotype, but terminalia not dissected.

Extremely similar to *A. perplexa*, differing as follows:

Male. *Head*. Width 2.5–3.6, mean 2.87 mm. Frons narrow, *Frw/Hdw* 0.1–0.2, mean 0.16. *Ivb/Vb-E* 1.1–1.4, mean 1.16. Ocellar setae usually very finely developed. Some specimens with more dark hairs on the upper occiput.

Abdomen. Some specimens with submedian marginals on tergite 3 well developed.

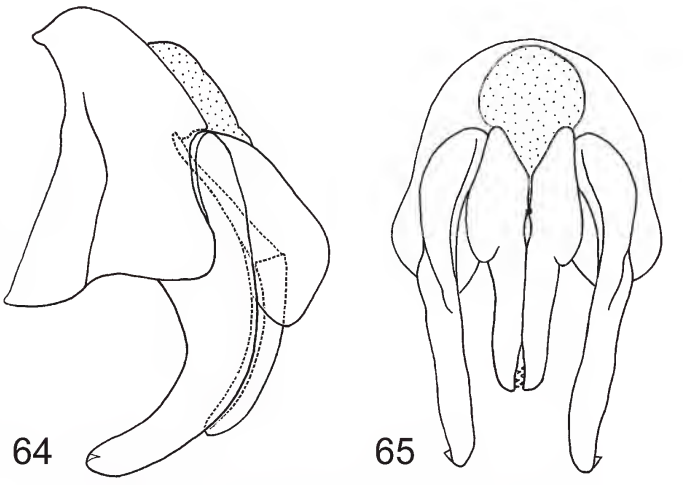
Terminalia (Figs 64, 65). Cercus with basal lobe less prominent, longer, posterior margin drawn out into a blunt-pointed sublobe that covers the base of the apical part, without the fringe of microtrichiae, but with a patch of same at the dorsal half of its base. Apical part relatively longer and narrower (digitate rather than thumb-like), with a subapical patch of setulae.

Female. Not recognized.

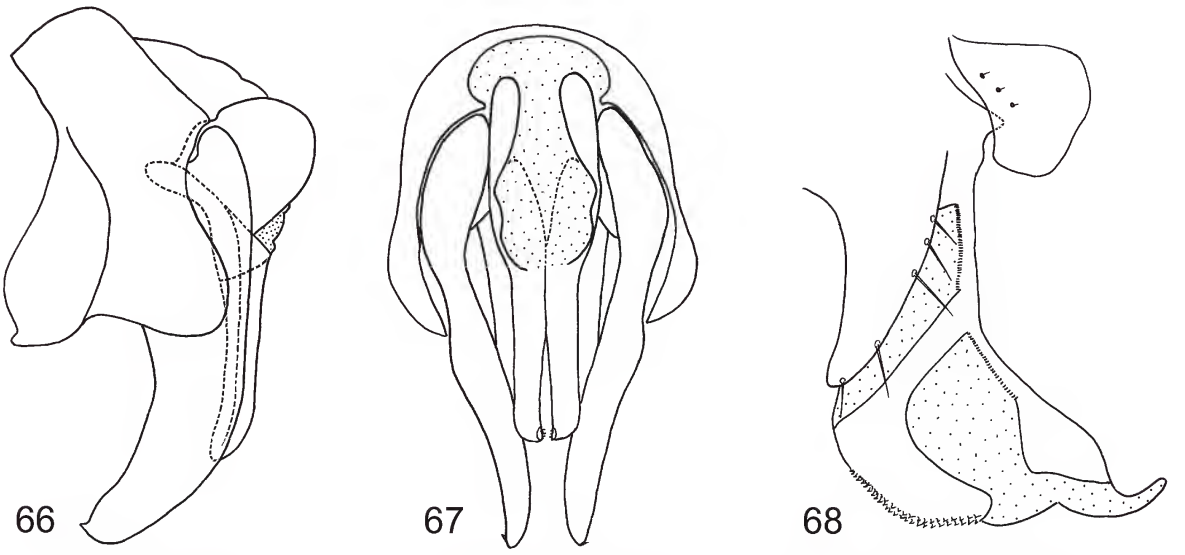
Distribution. ACT and Victoria and presumably more widespread in southeastern Australia.

Biology. Nothing is known except that adults come to light.

Notes. The name refers to the very narrow frons, relatively the narrowest in the entire group.



Figs 64, 65. *Anagonia angustifrons* sp. nov., male terminalia, *(64)* lateral, and *(65)* posterior views.



Figs 66–68. *Anagonia uptoni* sp. nov., male terminalia, *(66)* lateral, and *(67)* posterior views, *(68)* aedeagus.

Anagonia uptoni sp. nov.

Figs 66–68

Types. *Holotype* male in ANIC no. 29-029369, 18 mi W of Mogumber, WA, 13 Apr. 1968, IFBC & MSU; terminalia in tube 325. *Paratypes* (all males):—*Western Australia:* Wyndham, 4 Jan. 1930, T. G. Campbell, T.t. 72; 21 mi W of Kojunup, 21 Mar. 1968, IFBC & MSU, T.t. 359; 5 km SE of Millstream HS, 21°37'S 117°06'E, 17 Apr. 1971, IFBC & MSU, T.t. 2203; 14°49'S 128°49'E, Carson Escarpment, 9–15 Aug. 1975, IFBC & MSU, T.t. 459.—*Australian Capital Territory:* Black Mtn, light trap, 11 Jan. 1958, IFBC, T.t. 127.

Very similar to *A. perplexa*, but rather smaller and differing as follows:

Male. *Head*. Width 1.8–2.6, mean 2.16 mm. *Ivb-VbE* 1.2–1.4, mean 1.30. Eye sparsely, finely or not at all haired. Ocellar setae sometimes not developed. Parafacial with ground colour very pale in tropical specimens, but only along anterior margin in those from southern areas.

Thorax. Apical scutellars directed upwards.

Legs. Tibiae concolorous with femora. Hindtibia with *pd1* usually short, *Pd1/Sdd* 0.4–1.0, mean 0.77.

Terminalia (Figs 66–68, 79). Cercus with basal lobe prominent, rounded, separated by a relatively large, membranous "notch" from apical part, with a patch of fine microtrichiae on ventral part of base; apical part straight, almost rod-like, about 1.5–2.0 times as long as basal part, with stout preapical tuft of spiny setulae and several scattered along the shaft, apex lying at about the bend of surstylus. Surstylus bent at about ⅔ its length from base (about ½ in other species).

Female. Not recognized.

Distribution. Most of the few specimens known are from Western Australia, but there is also one from ACT.

Biology. All that is known is that adults come to light.

Notes. Apart from the expected difference in ratio *Ivb/b-E*, due to overall size difference, *A. uptoni* differs from the other relatively small species, *A. minor*, in *Ivb* independent of size. It is noticeable that specimens from the north of Western Australia are distinctly paler than those from the south.

Named for my colleague Murray Upton, whose passion for Lepidoptera never precluded collection of many interesting Diptera.

Anagonia errator sp. nov.

Fig. 80

Types. *Holotype* male in ANIC no. 29-029360, Illungnarra waterhole, 90 km SSW of Urandangi, NT, 15 Oct. 1978, DHC (at light), terminalia displayed *in situ. Paratypes* (all males):—*Northern Territory:* 2 specs. as for holotype, T.t. 2498 and 2215; 22 km WSW of Borroloola, 2 Nov. 1975, MSU, T.t. 465; Caranbirini waterhole, 33 km SW of Borroloola, 21 Apr. 1976, DHC, T.t. 2205.—*Australian Capital Territory:* Black Mtn, light trap, 17 Jan. 1962, IFBC, T.t. 140; the same, but 9 Jan. 1964, T.t. 147.—*Western Australia:* Mt Claremont, Perth, 10 Apr. 1968, IFBC & MSU, T.t. 344; 16°08'S 136°06'E.

Male. Externally, practically identical to *A. uptoni*, differing mainly in the terminalia. Also, rather larger, *HdW* 2.2–2.9, mean 2.61 mm; *Ivb/Vb-E* 1.1–1.2, mean 1.16.

Terminalia (Fig. 80). Rather similar to *A. perplexa*, but (in lateral view) cercus with basal lobe rather less prominent, with a (usually) small patch of microtrichiae centrally at base, and separated from apical part by a distinct "notch". Apical part a little shorter than basal part, its apex at about the bend of the surstylus, curved and "thumb-like", with subapical patch (rather than tuft) of setulae covering about ⅓ its length, rest of posterior surface with numerous microtrichiae.

Distribution. Specimens seen from Northern Territory, Western Australia and the ACT.

Biology. Most specimens were taken at light, but one was reared from larvae of the weevil, *Gonipterus scutellatus*.

Notes. Despite the stout similarity to *A. uptoni*, the fine detail of the terminalia leaves no doubt that this is a good species. The name refers to the remarkably wide geographic distribution of the few specimens seen.

Anagonia similis sp. nov.

Fig. 81

Types. *Holotype* male in ANIC no. 29-029367, Illungnarra waterhole, 90 km SSW of Urandangi, NT, 15 Oct. 1978, DHC (at light), terminalia in tube 2224. *Paratype* male:—*New South Wales:* Dubbo, 24 Jan. 1909, T.t. 2187 (pinned above an adult weevil, probably *Gonipterus* sp).

Very similar to *A. errator* and *A. uptoni*, but differing as follows:

Male. *Head*. Width 3.0–3.1, mean 3.05 mm. *Ivb/Vb-E* 1.2–1.3, mean 1.24. Postocellar setae 5–6.

Terminalia (Fig. 81). Structurally resembling *A. uptoni*, with apical part of cercus similarly rod-like, but basal lobe of cercus longer and narrower, almost as long as apical part, and much less prominent.

Female. Not known.

Distribution. Qld and NSW.

Biology. The association of one specimen with an *adult* weevil is suggestive, but inconclusive.

Notes. Although rather like a "large" form of *A. uptoni*, the differences seem more than enough to recognize this as a basic taxon and presumably a good species; the basal lobe of the cercus is especially distinctive. Also, the *Ivb/Vb-E* ratio is remarkably high for such large specimens and the postocellar setae are distinctive (although that might be spoilt by discovery of further specimens!).

The paratype, associated with an adult specimen of weevil, suggests that this may be the host. However, the evidence is very indirect, since the actual host would have no doubt been a larva.

Ungrouped species

The remaining species display no attributes that could be convincingly used for groupings. There are resemblances among the female terminalia, but until species can be accurately identified as females there is little point in pursuing that aspect.

Anagonia lateralis (Macquart)

Figs 69–71, 89

Masicera lateralis Macquart, 1846:291.

Type. *Lectotype* male in BMNH (Crosskey, 1971:274); type locality: Australia.

A very dark species of small to moderate size. Differs significantly from the *pale form* of *A. rufifacies* as follows:

Male. *Head*. Width 2.0–2.5, mean 2.20 mm. Frons relatively narrow, *Frw/Hdw* mean 0.20; gena likewise narrow, *Gnw/Eyh* 0.3–0.4, mean 0.31. *Ivb-Vb/Vb-E* 1.1–1.5, mean 1.32. Eye with at most very sparse hairs. Reclinate upper frontal bristles more or less contiguous with reclinate upper orbital bristles. Upper occiput with black setae behind the postocular row highly variable, from a few scattered setae (usual) to a complete row.

Thorax. Prescutal median dark vitta variable. Presutural intra-alar seta rarely fine or absent. Intrapostalar bristle usually strongly developed (but occasionally lacking). Proepisternal hairs usually dark, rarely pale or mixed. Scutellum usually largely pale, with dark band on basal 10–30% (occasionally wider); apical setae upcurved or upward directed.

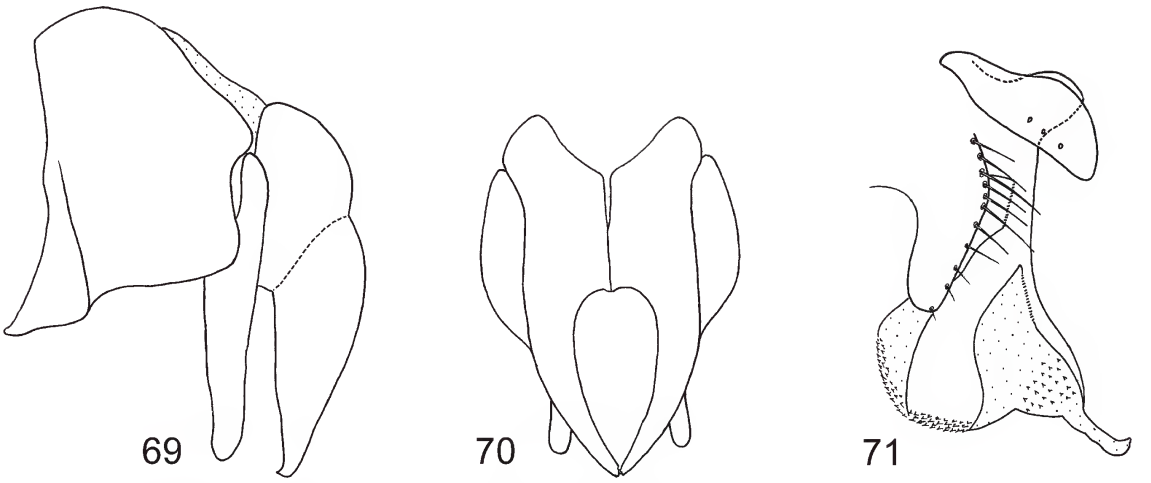
Wing. Tegula very dark brown, basicosta brown. Lower calypter grey-brown on basal half.

Legs. All dark. Foretibia with preapical *ad* spine stout, at least 0.5 of length of adjacent *d* spine, often almost as long. Hindtibia with *ad* comb noticeably sparse and coarse; *pd1* fairly long, *Pd1/Sdd* 0.8–1.2, mean 0.97.

Terminalia (Figs 69–71). Surstylus in lateral view narrow-digitate, sparsely setulose on about basal ⅔; cerci each with broad basal portion and strongly tapered apical portion, the latter widely separated basally, strongly incurved apically to produce a forcipate appearance in posterior view. Epiphallus about as broad as long, rounded; pregonite rather stout and curved, with spiny bristles; acrophallus unusual, membrane spiculate on "heel" as usual, but also in area of the "toe". The characteristic, forcipate cerci are normally visible in dried specimens.

Female. Association with the male is reliably based on co-rearing, plus general resemblance in chaetotaxy. Other females were identified by characteristic terminalia. Resembles male in all but usual sexual characters, but head with at most a few scattered dark setae behind the postorbital row, often none at all; proepisternal setae always pale.

Terminalia (Fig. 89). Tergites 6 and 7 and sternites 6 and 7 large, strongly developed, almost completely enclosing the segments; intersegmental membrane with fine pale pile. Tergite 6 entire, with small apical medial notch; sternite 6



Figs 69–71. *Anagonia lateralis*, male terminalia, *(69)* lateral, and *(70)* posterior views, *(71)* aedeagus.

saddle-shaped, with profuse tiny spiny bristles on apical quarter. Tergite 7 almost completely divided, but hemitergites large, quadrilateral, each linked to sternite 7 by a small basal sclerotized strip; sternite 7 also saddle-shaped, with scattered, short spiny bristles, becoming dense and microscopic along posterior margin. Dried specimens may be identified by the collapsed sclerites, which form a protruding, shiny, almost semicircular keel.

Distribution. Recorded from all mainland states except Victoria, where it no doubt occurs also. The species seems especially prevalent in the more arid inland areas.

Biology. Specimens were reared from larvae of the genus *Calomeles* (Chrysomelidae), an unidentified species feeding on *Acacia* sp. near Braidwood, NSW and (perhaps significantly), *C. satelles* in Perth, WA. *Anagonia lateralis* is abundant at light in arid areas, presumably parasitising chrysomelid larvae that feed on desert acacias.

Notes. I have checked Crosskey's lectotype, which has the characteristic terminalia described above. I am moreover fairly convinced that the association of the sexes is correct. The species does, however, display a remarkable degree of variability in, for instance, the colour of the upper occipital bristles and the length of *pd1* of the hindtibia. It is also unusual in that both sexes can normally be identified as dried specimens by virtue of the large characteristic terminalia.

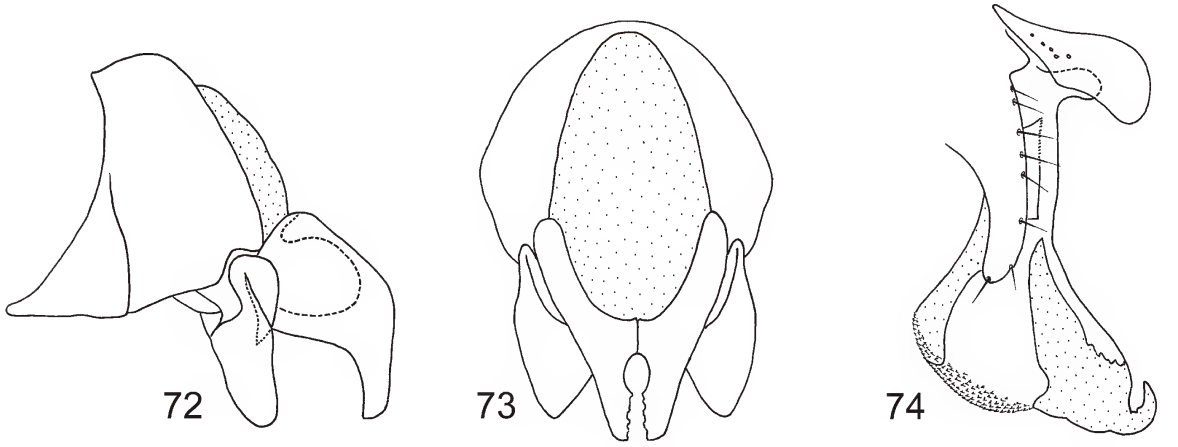
Anagonia crosskeyi sp. nov.

Figs 72–74

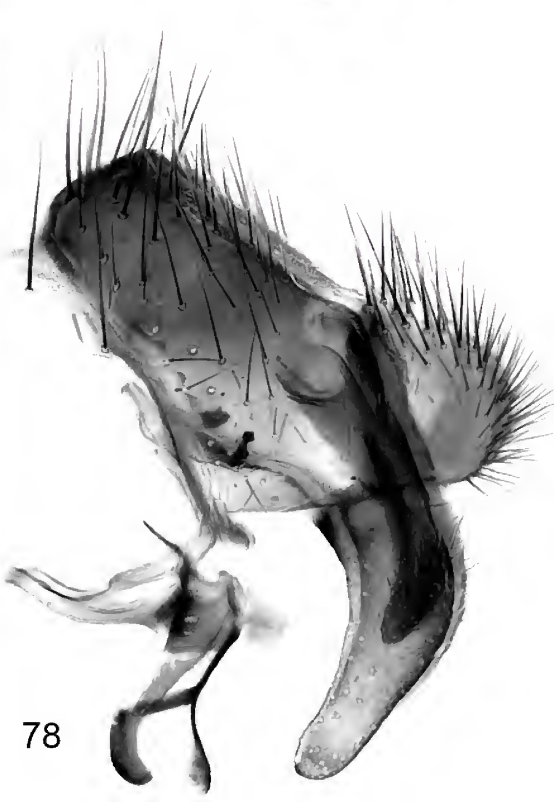
Types. *Holotype* male in ANIC, no. 29-029225, 16 mi W of Ouyen, Vic., 15 Mar. 1966, MSU and J. A. Grant, terminalia in tube 190. *Paratypes—Victoria:* 1 male, same data as holotype, T.t. 102.—*Western Australia:* 1 male, 1 mi WNW of Balladonia Motel, 3 Nov. 1969, Key & MSU, T.t. 384.

Generally similar to *A. rufifacies* (*pale form*), but all hairs and bristles dark (except as usual on occiput); differing also as follows:

Male. *Head*. Width very variable, 3.8 mm in 1 specimen, 2.5 mm in 2 others. Frons rather wide, *Frw/Hdw* 0.2–0.3; gena also rather wide, *Gnw/Eyh* 0.3–0.4. *Ivb/Vb-E* normal for size, 1.1–1.2 (means omitted, as 3 specimens very different in size). Eye practically bare. Fronto-orbits dark in ground colour, parafacial somewhat variable. Ocellar setae not differentiated; postocellar setae 2–4.



Figs 72–74. *Anagonia crosskeyi* sp. nov., male terminalia. *(72)* Lateral, and *(73)* posterior views, *(74)* aedeagus.



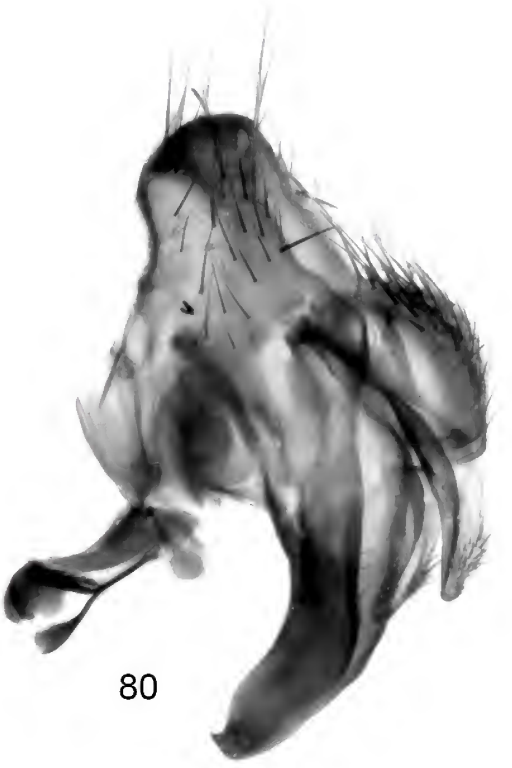
Figs 75–78. Lateral views of *Froggattimyia-Anagonia* male terminalia. *(75) Froggattimyia macdonaldi* sp. nov., *(76) Anagonia teratostylus* sp. nov., *(77) A. minor* sp. nov., and *(78) A. perplexa* sp. nov.

Thorax. Median vitta poorly differentiated. Presutural intra-alar bristles well developed. Intrapostalar well differentiated. Scutellum brown with variable degree of darkening at base; apical setae very variable, from fine to unusually stout. Calypter pale except along extreme medial margin.

Legs. Tibiae concolorous with femora. Foretibia with preapical *ad* spine about 0.5 times as long as adjacent *d* spine, which is rather smaller than usual. Hindtibia with *pd1* long, *Pd1/Sdd* 1.1–1.4; *ad* comb variable, from profuse to quite sparse.

Abdomen. Submedian marginal bristles lacking on syntergite 1+2, barely or not at all differentiated on tergite 3.

Terminalia (Figs 72–74). Appendages noticeably small



Figs 79–81. *Anagonia* male terminalia, lateral views. *(79) Anagonia uptoni* sp. nov., *(80) A. errator* sp. nov., and *(81) A. similis* sp. nov.

compared with syntergosternite 6–8. Surstylus paddle-shaped, bluntly tapering, with short, wiry bristles. Cercus with greatly expanded basal section with normal hairs and profuse microtrichiae, tapering to a shorter apical section, which is curved, sharp-pointed and claw-like, with conspicuous apicointernal teeth over much of its length. Epiphallus well developed with rounded apex.

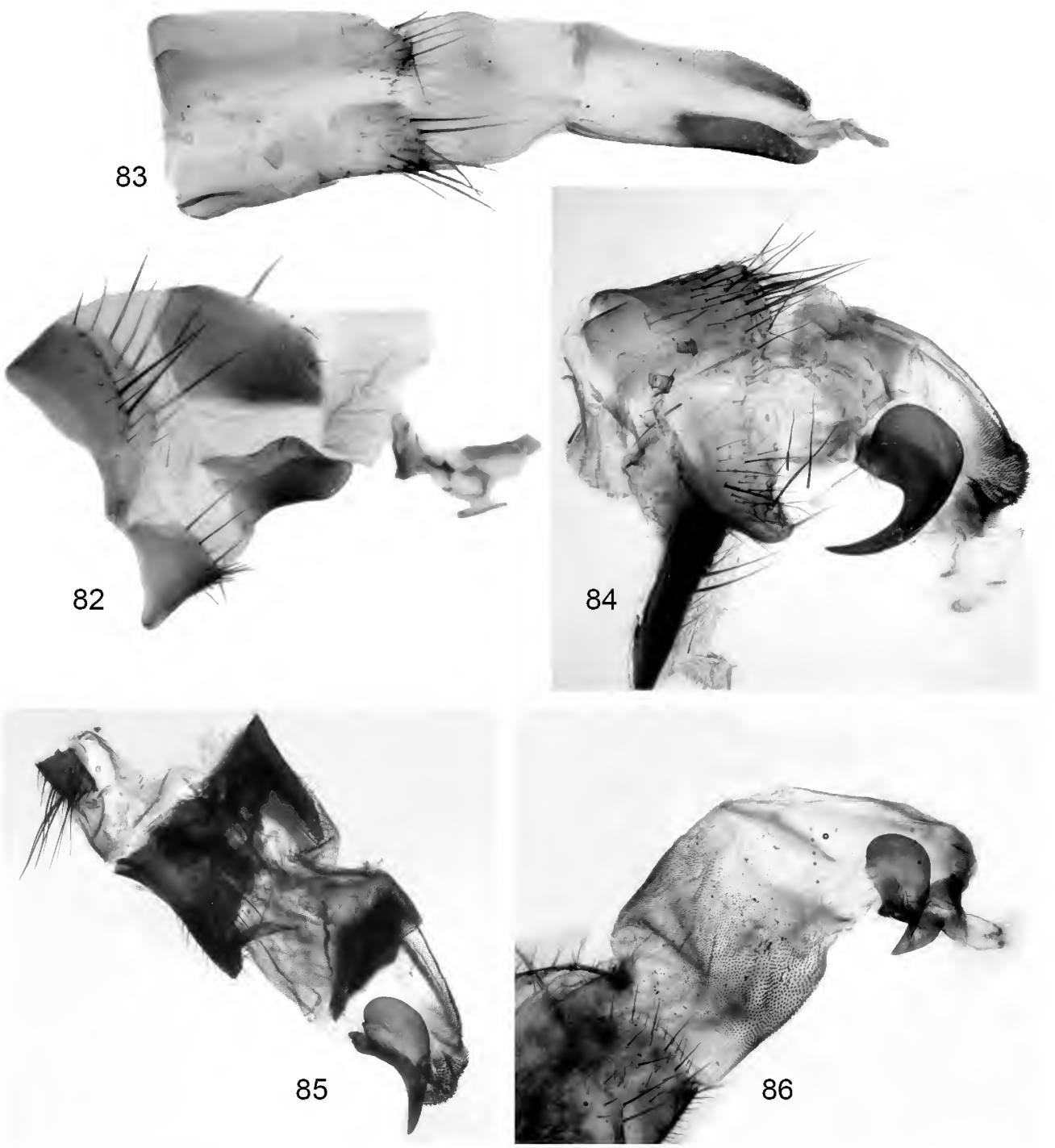
Female. Unknown.

Distribution. Seen only from Victoria and Western Australia.

Biology. All specimens were taken at light.

Notes. Despite the few specimens seen, the extraordinary terminalia guarantee specific status. One specimen from Western Australia is 1.5 times as large as the other two from Victoria, but, again, the terminalia leave no doubt that they are conspecific.

The name commemorates my friend and colleague, Dr Roger Crosskey, whose magisterial pioneering studies made this study possible.



Figs 82–86. *Anagonia* female terminalia, lateral views. *(82) Anagonia rufifacies, (83) A. tillyardi, (84) A. lasiophthalma, (85) A. dayi* sp. nov., and *(86) A. commoni* sp. nov.

Figs 87–89. *Anagonia* female terminalia, lateral views. *(87) Anagonia zentae* sp. nov., *(88) A. opaca*, and *(89) A. lateralis.*

ACKNOWLEDGMENTS. My thanks are due to the colleagues, far too many to name individually, who in their various ways provided or otherwise gave access to the material on which this study is based. I must, however, acknowledge the professional help provided by Roger Crosskey, the late Curtis Sabrosky, and Monty Wood; Chris Reid for help with details of host chrysomelids; and Anne Hastings, Chris Manchester, and the late Dr S. P. Kim for much assistance with the figures. I am also indebted to the Division of Entomology, CSIRO, which provided me with the necessary resources, in field and laboratory, as an officer and later as a Senior Research Fellow.

[This work was received for consideration, as a publication in *Records of the Australian Museum,* in March 2011. During that year, Don worked with the Editor to address comments and suggestions raised by the two reviewers Monty Wood and Bryan Cantrell. Sadly, a few weeks after Don heard that his work was accepted for publication in January 2012, he passed away and was unable to set eyes on the final proofs. A visit to Sydney (AM) and Canberra (ANIC) by Monty and Grace Wood in October 2012 provided an opportunity for the proofs to be carefully checked by some of Don's expert colleagues. For this I am sure Don would have been most grateful.—Editor, November 2012]

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Manuscript submitted 30 March 2011. Reviewed by B. Cantrell and M. Wood. Proofs checked by M. Wood and the Editor.